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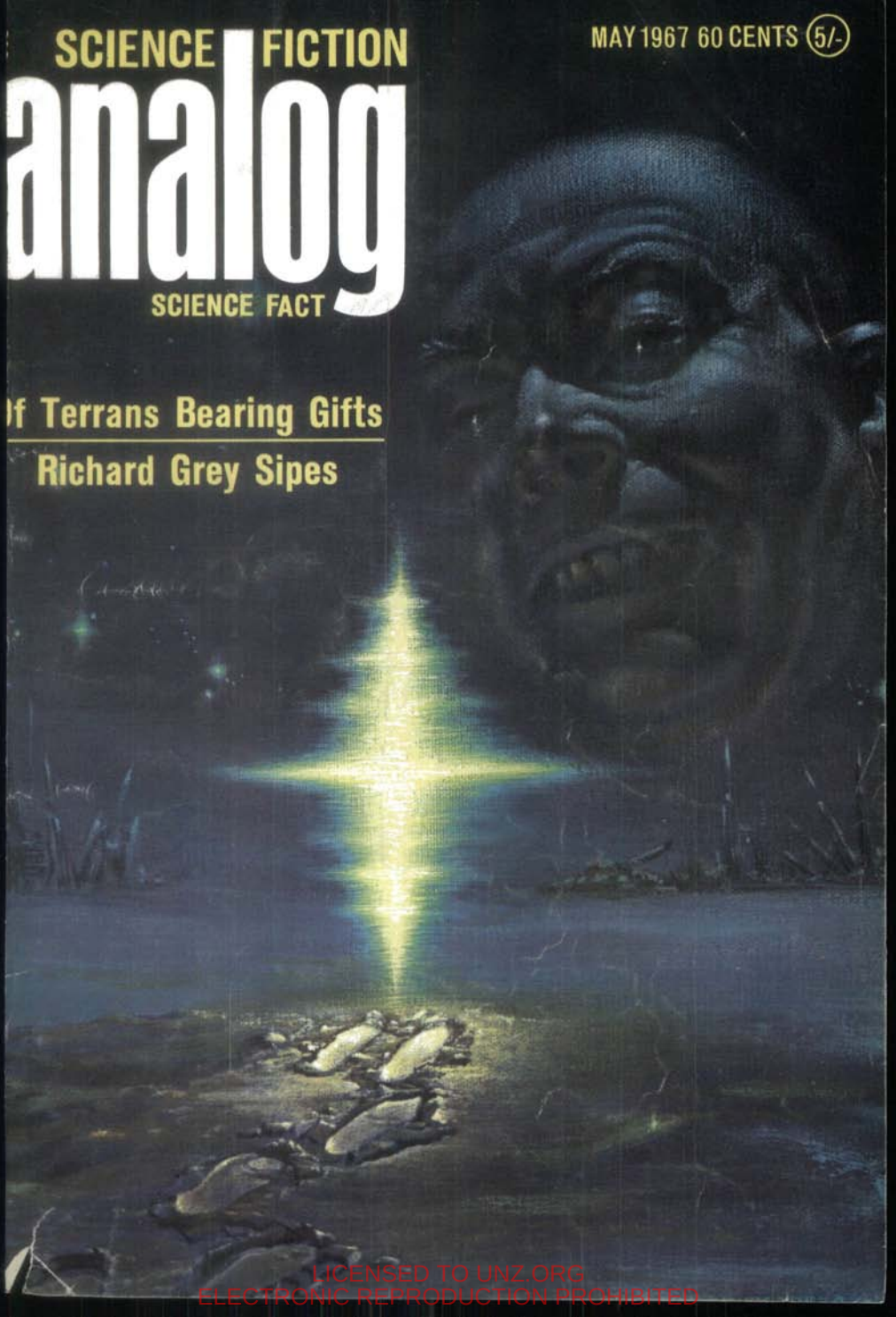

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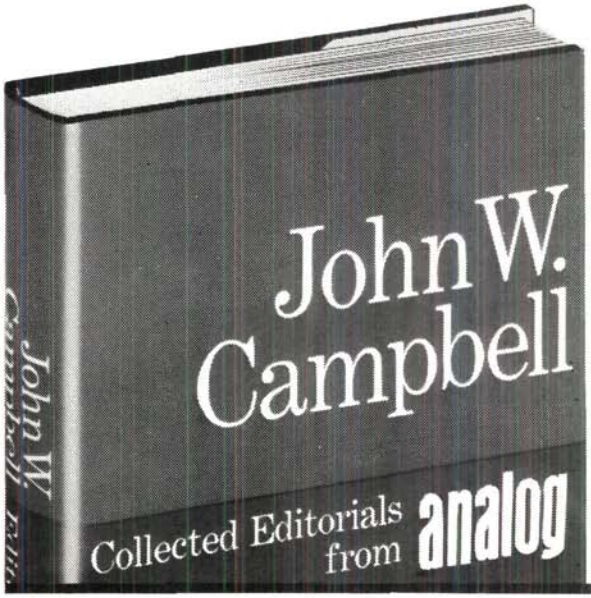

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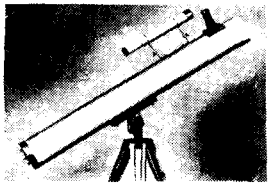

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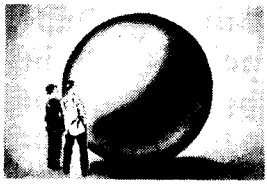

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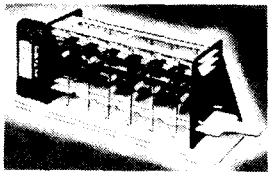

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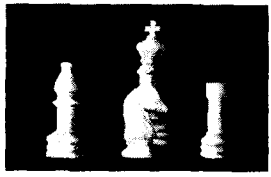

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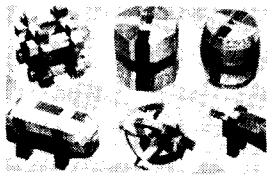

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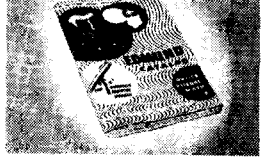

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The Safest Form of Transportation

Editorial by John W. Campbell

As of January 30, 1967 travel by spaceship retains its unblemished record as the safest known form of travel; in hundreds of millions of miles of travel, not one person has been killed or injured.

The deadly flare-fire that killed Grissom, White and Chaffee killed them on the ground; that fire couldn't have happened if they'd been in orbit. Hal Clement, years ago—March 1949—in his story "Fireproof" pointed out that fire won't burn in free-fall, because of the lack of effective acceleration to give hot gases less weight than cold gases. And without that weight difference there can be no convection current to sweep away the combustion products, and sweep in fresh oxidizer.

One of the news services commented that there were no fire-extinguisher arrangements aboard the capsule. True . . . but a somewhat incomplete statement. Writing as I am on January 29th, I'm sticking my neck out trying to speculate what the answers might be. We're not a news magazine—and with a slow publishing schedule such as ours, you'll have the reports from the investigating committees before this reaches you. So why discuss it when I don't have necessary data?

Because speculation about this fire is precisely what it takes to consider what fires might have been; as soon as you know just what caused this one, you'll be able to say "Oh . . . but that wasn't relevant; it didn't happen." The error in that statement is that "It didn't happen . . . *yet!*" It's harder to think of what might have been—and might be next time!—when you already know what was.

The conditions present were extremely dangerous—which every man involved knew well in advance. Just as every man who ever lifted off to space on the top of X tons of high-energy propellants knew it was dangerous. The big boosters so far have all been liquid-fuel propelled, because liquid fuels have higher energy per pound than solid propellants. To fully appreciate

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what this means though, remember that nitroglycerine is one of the standard components of solid propellant—and *not* the most energetic component used, either!

Every astronaut and cosmonaut who has taken off has been fully aware that "pioneering is the business of learning new and unexpected ways of dying." Every one of them has known that Sudden Death is their fellow passenger.

The visible violence of the take-off of one of the Big Birds makes it obvious that there's danger; the danger of the check-out procedures is quiet and invisible—until last Friday, January 27th.

There are no fire extinguishers in a space capsule—for two reasons. In space, they *are,* as Hal Clement said, "fireproof."

Second, there are a lot of modern technical materials that the fire safety rules list as "Inextinguishable Substances." Titanium, magnesium, and some of the nuclear metals rank high on the list. Fire-safety rules say, in effect, that if titanium or magnesium starts burning—get out of its way, and let it finish. Then try to prevent further spread of the fire.

Water thrown onto burning titanium or magnesium will cause it to flare up in real violence. Carbon dioxide is an excellent oxidizer for either one—it just takes the oxygen away from carbon, and produces billows of black smoke. Cutting off the oxygen won't stop titanium; it burns just as fiercely in pure nitrogen as in air; in fact when burning in air it produces roughly 80% TiN and 20% TiO—it doesn't care which it grabs. Foam, of course, is just air and water—or carbon dioxide and water, both of which are excellent oxidizers for Ti.

Now the interior structure of space capsules has to be made of light, strong materials—and the lightest in terms of strength per pound happens to be beryllium. Unfortunately, geologists have guesstimated that the total quantity of beryllium in Earth's crust amounts to something on the order of 10,000,000 tons. If it weren't that its chemical nature tends to cause it to separate from the general rocks in isolated crystals, we wouldn't be able to use it at all. As it is, it's extracted from crystalline beryllium-aluminum silicate crystals, hand selected from the ore mass. These crystals are also known as aquamarine. The metal sells for about $75 a pound, and there isn't a generous supply.

However, because its density is low (1.8 vs. 2.7 for aluminum, 4.5 for titanium, and around 8.0 for stainless steel) and its tensile strength and stiffness comparable to steel it is used. Its melting point is about the same as steel's, and it has good resistance to oxidation even when hot, so beryllium "shingles" have been used on the outside sheath of space capsules, although

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titanium was used for the inside structural members, which weren't exposed to atmospheric friction heating during reentry.

Titanium is extremely resistant to atmospheric oxidation . . . up to a point. It's used for making jet-engine turbine blades because it retains high strength and light weight even when run hour after hour in the incandescent-hot flame of a jet-engine turbine. Titanium will burn in air with immense violence . . . but you do not light it with a match! Once started, however, its combustion releases so much energy that the fire is inextinguishable under any ordinary circumstances.

It can be extinguished if it's drowned in helium, neon or argon, of course—nothing has yet been found capable of reacting with those gases.

The other way of extinguishing it is very simple in space—evacuate the place, and the fire goes out for lack of atmosphere. Apollo's "fire extinguisher" system was simply the fact that the astronauts can open the hatch any time they want to.

Unfortunately, spaceships are not "fireproof" on Earth; convection currents do exist here. And opening the hatch doesn't instantly produce a hard vacuum, when you're sitting on Launch Pad 34 at Cape Kennedy.

The fire that ended the flight of Apollo 1 long before the final countdown began probably couldn't have happened in space.

What could happen under the then-existent circumstances? (I am not asking "What *did?*" but the more general question, "What *could?*" Remember that Finagle's First Law can be very deadly: "In any experiment, anything that can happen—will.")

Starting a titanium fire, even in a pure oxygen atmosphere, at 16 pounds per square inch, is *not* easy. Two things that were available in the ship under those conditions could do it, however—an oxy-hydrogen blowtorch, and an electric arc. An electric arc can ignite even heavy-gauge titanium in a second; I've tried it using a 28-volt storage battery and a small carbon (from an AA size dry cell). The capsule was operating on internal power at the time; that means the oxygen-hydrogen fuel cells were in operation—and they normally yield about 28 volts DC at several kilowatts. An arc, fed by one of those batteries, would be quite adequate to start a titanium fire burning; it would be easy for it to start magnesium structural members (Mg is even lighter than beryllium —1.7 density—but has a low melting point, and is soft and relatively weak. However, it's entirely satisfactory for light-duty structural members). Once started, either titanium or magnesium would burn with terrific brilliance, and enormous heat.

Either one produces a fire capa-

continued on page 172

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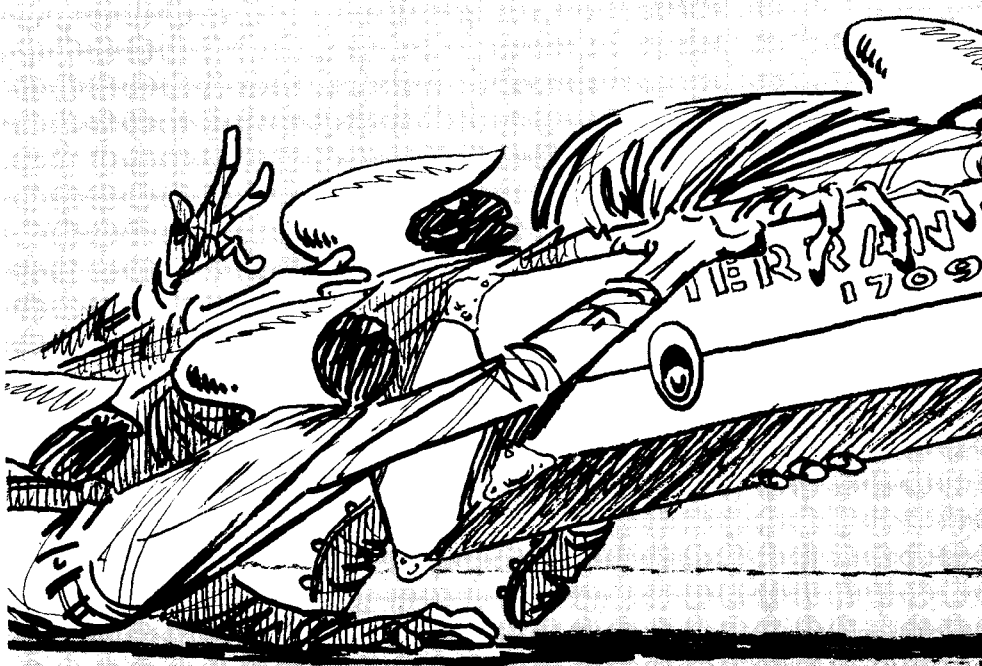
Of Terrans Bearing Gifts

There are some things that people get "hooked" on,
and can't give up, once they've had them, and pretty generally
the hooked try hard to get others to join. . .

RICHARD GREY SIPES

Illustrated by Kelly Freas



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Thermonuclear weapons are notorious for indiscriminate destructiveness and for unpleasant and long-range side effects. They aren't suitable for conquest of one's own planet. Because of this Chk/nil, although the leading and most powerful nation on its world (Nr. 126-24 Wilson Two, UTCC), had been unable to bring under its dominance the remaining nations of the planet. She had several competitors, of which the small, tightly organized militaristic dictatorship of S1st and the great merchant state of Krknûm were the most justified in their private aspirations toward empire. These two nations were the first to exploit the sudden breakdown of the Chk/nilian national organization in the Year of the Cherg 1082.

For several months the two hovered like hyenas unable to believe that the great lion finally had expired. Eventually their unquestionably good fortune was verified beyond doubt and they formed a hasty alliance to feed on the corpse of Chk/nil.

S1st's ruthless swept-wing jets protectively swarmed about the great armada bringing Krknûmian troops as they split the skies above crumbling Chk/nil. Only sporadic organized resistance was encountered, although innumerable small local pockets of ferocity resulted in a large number of invader fatalities. Nevertheless the major Chk/nilian cities were taken in a period of days and the entire country effectively occupied in a matter of weeks.

S1st and Krknûm required several weeks to conquer Chk/nil; the citizens of Chk/nil took a little longer to conquer the invaders. The invaders' governments crashed in early 1083 Y.C., about six months after the invasion. The smaller nations, like vultures, hastened to feed upon the bodies of lion and hyenas alike. The deadly blight spread. In two years all political organization, as it had been conceived of in the past, had become a thing of the past. In twenty years its passage was no longer even mourned. The age of very rugged individualism had arrived.

The man half-reclined on a carved and inlaid thronelike couch worth the ransom of a kingdom. Rich clothing of exotic cut and texture swathed his obese body. His shiny bald pate gleamed in the dim light of the room and heavy-lidded eyes peeped out over massive jowls. Ignoring the wealth from a hundred worlds that surrounded him, he stared into empty space, waiting.

All of the man's attention seemed concentrated in the fingertips of his fat bejeweled hand as it caressed the head of the golden animal crouched by him. A mewling sound of contentment came from the animal's fanged mouth and long silvery claws worked in and out as it luxuriated under the touch of its master. Both, in different ways, gave

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the impression of languid strength.

Suddenly the creature's eyes flashed open and the pupils dilated. From out of nowhere a figure had appeared in the center of the room. The rippling muscles of the catthing tensed, flexed, and the creature launched itself like an arrow toward the intruder, a low-pitched rasping sound coming from its throat.

"Hi, Puss," said Chuck Rajaonarivelo, bending down to the animal which was rubbing against his leg. He grabbed its muzzle in his ebony hand and gave it a playful shake. The thing spun and gently tapped at the hand with a softened paw. It capered around him as he leaned back into something that looked like a fragile spider's net hanging unsupported in the air. Chuck lifted a foot to casually scratch the beast's back when it flopped itself in front of him.

"Well, J.B.," he said, turning his attention back to the corpulent reclining figure, "here's the scoop. This star is 126 dash 24 Wilson in the United Trader's Committee Catalog. It's a Class Three with five planets. The second planet is Terra —similar to point nine five—and has an uncontacted, but very developed, race. Last automated survey contact was about five hundred years ago, at which time they didn't have even thermal power. The catalog shows another survey due in about seven hundred years.

"Seven hundred?" wheezed J. B.

"Yeah. And already they have" —Chuck held up a hand and ticked off on his fingers—"one settlement on an outer planet—which looks like it was intended to be permanent; one more probably scientific outpost on another outer planet; one installation on their own world's satellite, and that one appears to be a military one. That military/scientific outpost we first found on 126 dash 15 Wilson Three, of course. And another similar one in 126 dash 92 Wilson Seven. Other planets in those two systems, as you know, have sentient life forms on them. Looks like these people intend conquest."

"Fascinating," murmured Winslow. "It's a good thing for this end of the arm that we happened to run across that outpost. These fellows could have caused quite a stir out here before they were surveyed again. You know, Chuck, they must have had a previously high level of civilization and the survey just caught them in a period of regression."

Chuck shrugged. "Maybe. Or maybe their innate motivation index is comparable to ours. That could account for it, too—if they have all modes of mentation available to them that we do. Anyway, as we planned, I had our Brain select seven random spots on the planet and I picked up an individual as close to each of these spots as I could. I motivated them to hold the translators and to listen to radio

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broadcasts for several days. The Brain and I monitored them. Then I wiped out their memories, put them back where I found them, and left a little gold payment by each.

"Here is what the Brain tells me: The planet is politically fragmented into twenty-seven political units with twenty-three different languages. Only nine of the nations have what we assume to be an indigenous technology. It seems that only three of them would be major contenders for pan-planetary rule. A single nation, Chk/nil, put up all but one of the extraplanetary installations. Here's something interesting—all of the more civilized nations appear to be highly structured. They all have six major classes or castes: Military, political, commercial, scientific, religious, and worker. These seem to be rigid and inherited, with no migration."

Winslow whistled. "All advanced nations highly structured? And the less advanced ones are not?"

"Two are. The rest aren't."

"You know what that could mean, Chuck? If all their developed groups are structured and their undeveloped ones are not, their MI and their mode count may be even higher than ours. At least we never needed class rigidity to keep our developed groups from fragmenting." He heaved his body erect with an elephantine grace. "This may turn out to be a lovely game. Let's get going on it." He beckoned to the other, said: "Control Room"—and disappeared. Chuck Rajaonarivelo gave one last rub to the golden creature at his feet and then disappeared. The animal howled its protest at being left alone.

First Winslow and then Chuck flicked into existence in the ship's control room. Winslow stepped over to a bare wall and touched it. Immediately it seemed as if the wall dissolved to reveal the planet over which they hovered. A wave of his hand and the screen-filling image began to slowly revolve.

In a moment Chuck pointed and said, "The lower half of that oblong continent there at the bottom—that's Chk/nil. They are the ones that are star-hopping." He moved a finger and the image halted. Lights of various sizes sprang into being in that section. "Cities," he said. One of the larger ones began to blink. "Capital." Tiny red lights appeared, scattered over the area. "Nuclear-armed missiles." Then more red lights, this time on other portions of the visible land masses. "More missiles. Other countries," said Chuck.

"Let's see the other side, Brain," said Winslow.

"Right," came a voice from somewhere. The image began to turn to show other missile sites on the other side of the world.

Winslow shook his head in dismay. "Armed to the teeth. All ready to sterilize the works. I'm glad we got here." He turned to his partner.

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"Remember that whatsitsname planet we ran into about a hundred years ago? The one we had to re-seed?"

Chuck winced at the memory. "I try not to. We'd better be careful how we go down there."

"Right. I'll place it right over the center of this Chk/nil nation, turn off our screens, come straight down, and then circle over the country in the atmosphere. That'll give them a good radar look and won't precipitate any shooting at each other." Winslow strode rapidly over to the control console and seated himself in a chair that expanded to accept his ample proportions. His hand reached out to touch the control plate. He formed an image in his mind of a ship's path and the great ship responded.

"Do you want any more data on Chk/nil?" asked Chuck as the image on the screen swelled at their approach.

"Heavens, no!" chuckled Winslow. "That would spoil the game. I already have a little too much for a real challenge. Just tell me the spot that you and Brain picked for us to land at and then keep quiet."

A point of light on the expanding image of Chk/nil flared and pulsed. Chuck said, "Two thousand kilometers from the capital, fourteenth city in size, small nearby nonmissile military installation, farmlands, correct location for a center of commerce."

A soft breeze stirred the grass of the highland glade in which the spherical ship rested. The grass filled the same ecological niche Terran grass did and, except for its green tending more toward blue, it was precisely similar to the grass of Earth. The bushes and trees surrounding the glade also paralleled their Terran ecological counterparts, although a closer inspection would leave no doubt that they were foreign to the home of Man. Small flying creatures flitted from branch to branch. They had lost less of the reptiloid characteristics than had their Terran niche-mates. A few squirrellike creatures shrieked at the intruder and a small dark form scurried down a hole in the ground.

Winslow and Chuck appeared at the side of the ship. Almost simultaneously several wheeled carts appeared nearby. The lumpy tarpaulins cinched over them told of heterogeneous contents. The two men scanned the cloud-flecked sky.

"This place is going to be lousy with planes pretty soon," said Winslow. "You'd better take the ship up again right away. Throw off the screens before you do so they'll see you leave."

"O.K. Sure you won't take a mind-changer with you, J.B.?"

Winslow shook his head. "I'm going to do this raw all the way through. Monitor me, though." He glanced at the sky again at the sound of a distant, growing roar. "Here they come. You'd better take it up now."

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The other nodded, then waved and disappeared. In a moment the ship lifted off. Gathering speed as it rose, it soon was lost in the deep blue of the sky. Winslow was alone on the planet.

He sniffed the fragrant air, enjoying his first Terroid planet in several months. He concealed the carts until the aircraft left and spent the time getting acquainted with the local flora. Then, with a resigned sigh, he turned south and picked his way through the underbrush. The three carts wended their way after him.

Soon he came to a dirt road. He followed it downhill at a leisurely pace. In less than a kilometer it intersected a surfaced road. He turned east on that. It ran level for several kilometers and then it, too, began to descend. As it did so it briefly revealed a panorama of the valley below.

The city lay in the center, its suburbs pressing hard against the foothills of the mountain chain farther to the south. On Winslow's side the city ended sharply in what appeared to be the industrial section. A broad river flowed along this side of the city. It met another, larger river on the plain to the east. The land in that direction was checkered with cultivated fields.

To the city's west Winslow could make out what must be the small military camp. Beyond that was more farmland. A major road passed down the valley and through the city. There were only two minor roads entering the city by bridges from the north, as far as Winslow could see. One of these undoubtedly was the one he was on. Both, unlike the east-west highway, were clear of vehicles. He grunted in satisfaction and moved downward, followed by his faithful carts.

Several hours later, near noon, Winslow ended his enjoyable stroll at the river bridge. There was a small building to one side of the bridge entrance, but he saw no sign of life in it. Mopping the perspiration from his brow, he started across the bridge.

In the guardhouse by the bridge were two uniformed figures. One was stretched out on a bunk, the other seated in a chair that afforded a view of the bridge and the road leading to it. The figures were humanoid in form. The universal necessities for sense organs and for manipulative and supportive limbs, and Nature's propensity to economize, made this form almost universal. The soldiers, however, would never have passed for humans even in a dim light. Their long heads were much narrower and their arms were articulated to very low, sloping shoulders. The trunk was thicker than that of a man and it sat on legs that were much shorter. The three-fingered hands could touch the ground from a fully erect posture, although the race had ceased to use their upper

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limbs for support millions of years before. The exposed parts of their bodies were covered with a soft, fine hairlike growth and their skin was a reddish brown.

Theirs was a quiet station. Little traffic passed over the road except for the occasional fruit farmers living in the hills, the Imperial Armed Forces trucks to and from the radar base to the north, and the Sixday flood of townsfolk to the high picnic grounds. Were it not that they could easily lose their heads if an I&CIC agent, or a representative of the Imperial Inspector General, caught them unawares, their surveillance would have been even more lax than it was.

The soldier at the window spotted Winslow and his little train several minutes before he reached the bridge. The guard's first glance was casual, as was his interest in the distant figure. He did not even bother to look that way again until the Trader paused at the bridge. Then he did a double take and leaned back to shake the sleeping corporal behind him. A moment later both were staring silently through horizontally slitted pupils from the protective darkness of the room. There was a hurried conversation between them. The Trader reached the middle of the bridge. Suddenly the one who had been seated raised his rifle and fired.

Winslow heard the noise and sensed the impact of the projectile almost simultaneously. A gray slug fell at his feet. Unthinking, he dabbed at his damp brow again and bent over to pick up the object. He dropped it at once, cursed, and stuck his burned fingers in his mouth. He teleported it up and held it before his eyes—soft-nosed expanding type. Apparently they had few rules in their war games. He let it fall and looked back at the small building. Then he grinned and waved at the dark windows. A fusillade of shots rang out and bullets, their energy drained by his shields, dropped on every side of him and his protected carts. He waved again and walked on toward the city. That would bring the military into the picture. Now to trigger off the political and the commercial castes.

The city police were under the political caste. Alerted by the military, they converged on him before he had gone over half a kilometer past the first of the dingy, smoking factories. They made their presence known by throwing up a barrier of vehicles and armed police across the avenue in front of him. Glancing back, he saw another line forming behind him. He kept on walking. As he approached the cordon a figure in a resplendent red uniform stepped forward and raised a gloved hand. A sharp, high-pitched bark issued from his thin-lipped mouth slit. No translator was needed. That meant *halt* to any species. Winslow halted and studied

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the police troops. They were fingering their guns nervously and shuffling their feet. A subdued, harsh chattering and whistling, almost too high in pitch to register in the human ear, passed among them.

Winslow slowly moved a little closer to the officer and cautiously, very cautiously, held out his hand. In the open palm lay a rod about twice the width of his palm and the thickness of a pencil. He was careful, as he proffered it to the police official, to keep its long axis at right angles to the other and to keep his fingers away from it. The officer quickly moved back half a step, but then, glancing at his underlings, boldly stepped forth and snatched the rod from Winslow's hand. It was a translator rod and the Trader began to speak as soon as it was in the grip of the other.

"My humble and heartfelt greetings, Colonel," said Winslow with a low bow and a smile, choosing a rank he was certain was too high. "The welcome of your splendid city overwhelms me. I cannot imagine why I, a poor and itinerant merchant, should be so magnificently greeted."

The police lieutenant almost dropped the rod in his astonishment. "You speak our language!" said the officer. There was a silence and then a murmur from the ranks. Winslow could almost see the officer's mind frantically working to assimilate the situation. "But you aren't of this world, are you?"

Good, thought Winslow. The fourteenth mode of mentation was definitely available, then. Depending on whether or not they publicize technical details on their extraplanetary findings, perhaps the fifteenth. Aloud he said, "Preternaturally astute of you, my Colonel. It is the Mark IV Handy Herald's Wand that you hold in your hand. That, and my own wand, permits us to understand each other even though we come from worlds separated one from the other by millions of parsecs. Wending my way past barren and tight-fisted worlds, I finally have arrived at your exquisitely rich and imposingly powerful planet to offer for trade a few small items, such as the one you now hold. I was just on my way to your market place to set up my stall."

The other looked with interest at the wand he was holding and then back to Winslow. He was on surer ground now. "Eh? What's that? A stall? Not a chance! We don't do things like that around here. First of all, there's the Merchant's Guild. They handle all buying and selling. Second, you have no right to be here at all. I'm putting you under arrest and confiscating your goods. Sergeant!" He whirled to another officer behind him. "Take this . . . ah . . . um-m-m . . . *man* into custody!" The sergeant and several others reluctantly moved forward to grasp the alien's arms.

"Oh dear," sighed the Trader. "I suppose I really put my foot into it

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this time. All right, Colonel. I'll go quietly. I'll presume to mention only one thing to you. The Merchant's Guild will be most grateful for immediate information on me. You might mention to them that the military undoubtedly will spirit me away as soon as they can and the Guild had better get to me fast if we're going to do business."

The Post Commandant, General Keetk, was on an inspection tour of some of Chk/nil's more pleasant tropical island installations. Most of his staff officers were with him, gathering valuable technical knowledge of the natives and beaches. Captain Cheel also would have gone, except that a Third-Star officer had to be at Camp Brt. When such an occasion arose it was Captain Cheel who was chosen to stay.

It wasn't that he was the most competent or trustworthy of Keetk's staff; it was that he was different. Not much different, just enough so that he didn't make as congenial a companion as his fellow officers. And he read books; sometimes even books forbidden those of the Military Guild. He was one of those strange few, found everywhere, that sometimes wondered just what the hell they were doing in the army.

Cheel, however, had a more pressing reason to be in than most. His father and his father's father and his ancestors for the last four hundred years had been officers in the Chk/nilian Imperial Armed Forces. He had the choice of being an officer, or of being a Disenfranchised. And the lot of the Disenfranchised was not exactly enviable. So Cheel was Captain Cheel, with good prospects of becoming Colonel Cheel some time in the distant future—when it no longer would matter—but with almost no hope of ever rising above that grade.

Most of his fellow officers, if left as Camp OIC, would have usurped the commandant's office while in charge. True to form, Cheel remained in his own tiny office. He was seated there now, tapping a translator rod on his desk top as he studied the strange figure standing in front of him. It was Winslow, relaxed and friendly, flanked by two burly military policemen. Behind him, on either side of the door, were two more, armed with rifles.

"A Star Trader, you say?" Cheel said. "Do you mean to tell me that you and your partner simply travel at will from system to system, trading?"

"That's about it, Captain," said Winslow. His manner had changed when the police had delivered him into Cheel's hands.

"It sounds like a rather free life," Cheel mused in a suddenly distant voice. "Like something our old minstrels used to sing about."

Winslow quickly plucked at the thread and his voice soared. "Much to my regret, Captain, you probably shall never know how free. The

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Universe is ours, to roam in as we please! Always a new planetfall, always a new adventure, always the call of another star. And always freedom."

Cheel's face held a dreamlike look as the Trader spoke. He recovered himself with obvious difficulty. "Yet it could be dangerous," he said, "like now."

Winslow shrugged and the translator wands he and the captain held converted the semantic content of the gesture, meaningless in itself to this race. "Certainly dangerous. Who would want it different? Yet my partner and I have managed to survive such a life for over two hundred years."

"Two hundred years!" ejaculated Cheel. "Your race is long-lived, sir. My race matures at fifteen and we usually don't live past fifty. I, myself, am twenty."

"Only twenty, imagine! Well, we're long-lived now, although at one time we were not."

"Then I can assume that this longevity is induced? Artificial? And possibly one of the products you claim to be selling?"

"As a matter of fact it is. But we don't have the equipment with us on this trip. It's available, though."

Cheel smiled. His smile consisted of a ripple of his scalp, but again the rods translated the meaning. "Yet apparently you have with you some things that would tend to promote survival in a somewhat different fashion. The reports here in front of me indicate our guards at the bridge peppered you with their automatic rifles and it didn't faze you."

Winslow managed a blush. "They must have missed, my boy. I did hear something whiz by, come to think of it," he said, scratching his head. "Their aim must have been spoiled by panic at my alien appearance."

Cheel looked at him in amused silence for a moment. "That must have been it," he said finally, obviously not believing the Trader. "But tell me: What are these products you did plan on selling or trading?"

"Well, we have our Handy Herald's Wands, of course, two of which we are now holding. Then there are jewels such as would enrapture even the most blasé and critical connoisseur. Cloth suitable for the raiment of kings. Herbs and spices—out of the thousands of which we have there will be several your race will find of inestimable value. Exotic works of art fashioned by the light of distant suns, and, of course, our Mark II and Mark V Personal Teleporters. Our dandy Housekeeper's Helper Levitator, and the remote-control Corsair Model Levitators; also our Family-Size Transmuter, and . . ."

"Hold it, Trader," said Cheel. "I'm lost. Just what are these last items? I have an idea from the words—but I *must* be wrong."

"Rather than my trying to explain, let me show you. I'll bring in

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my sample case," said Winslow, touching his sash. In a moment he frowned. "Just a moment, Captain. It seems as if they've locked my carts in a room and my sample case can't get to me. I'll be back instantly."

Winslow blinked out of existence and turmoil hit the room. Cheel leaped to his feet and roared for the guards to secure the door and window. An M.P. stationed himself at each as the others frantically searched the office. Cheel felt a little ridiculous in the midst of the search. There really was no place here for a creature of the Trader's bulk to hide.

But suddenly there he was again, standing in the same spot from which he had vanished. All four soldiers made a dive for him and held him immobile in their grasp. He spoke and Cheel could hear nothing but a deep rumble. Then he noticed he had dropped the translator on the desk when the Trader vanished. He picked it up.

". . . Very much, Captain. I should have warned you," said Winslow, intelligible once more. "That is the way our Mark II Personal Teleporters work. I just went over to free my sample case. It'll be along in a moment."

Before Cheel could reply another tumult began, this time in the hall outside the office. There were grunts and puffs and shouts of dismay. A knock sounded at the door and an agitated sergeant burst in yelling, followed by a sleek gray-and-black trunk. The unusual part about the trunk was that it floated about a half a meter off the floor and moved inexorably forward despite the feverish efforts of several soldiers to hold it back. The case scraped off its assaulters as it passed through the narrow doorway. They sprawled in a tangled pile. Motioning the distraught sergeant to silence, Cheel turned to Winslow. "This is your doing?"

The Trader nodded. "I'll explain everything, Captain, if you'll just get them away from my case and give us a little quiet."

Cheel eventually was able to clear the room of all but the original four soldiers. These released Winslow at the captain's orders. Winslow tugged his disarranged garments back into place and glared at the guards pressing close to him. Cheel snapped out a command and they moved back, but he had two station themselves behind his desk and cover the Trader with their rifles.

"Now," he said, "if you make one move to leave, by any means whatsoever, we'll see how much your appearance upsets the aim of these fellows at this close a range." He trusted his eyes off the Trader for a moment and turned to the sample case. It hung quietly in the air to one side of the room. It did not look particularly menacing at the moment, even though it was defying the law of gravity. But it had

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moved like a live thing just moments ago. He swung back to Winslow. "What do we have on our hands here? A sorcerer?" He didn't laugh when he said it.

"Hardly, Captain Cheel," said Winslow, smiling. "But I can understand why the thought occurred to you. By your leave, I'll sit down and make myself comfortable. Then you'll get the explanation you deserve."

Cheel motioned a soldier to move a chair over to where the Trader stood. Winslow took one look at its shape and decided against trying it. He turned to his sample case and it began to move toward him. Instantly he was the focal point of four gun barrels. Cheel impatiently motioned the guards to relax as the case came to a stop and Winslow climbed onto it and perched cross-legged on its lid.

"You are witnessing the operation of psionics, my friend. These devices are just as natural and as scientifically explainable as any other, although the science covering them has not yet been formed on your particular planet, as it has not been on most." Pausing, he watched the captain. He could sense the kaleidoscope of Cheel's mind. A reactive fear, a futile struggling to rationalize it all away, an urge to believe and, above all, a growing curiosity. Winslow continued. "This case's contents, and its own performance, are the type things we are here to sell. Think anyone will be interested?"

Cheel's eyes went to the hovering case and then back up to the Terran's face. He was incredulous. "Do you mean to say that you expected to come down here and just start to sell those things on the streets to any passerby?"

"Why not?" asked Winslow in wide-eyed wonder.

Cheel's laugh-equivalent was sharp and bitter. "We won't go into the fact that the Merchant's Guild members are the only ones who can engage in commerce in Chk/nil; indeed, in any civilized country. You couldn't have known about that, I suppose. But surely you have been around enough to imagine what the unrestricted sale of such things would mean to our national security—to any national security. Besides," he said with just a touch of wistfulness, "I imagine they would be prohibitively expensive."

"Of course I didn't know about your guild setup here," Winslow said. Then, spreading his hands, "National security? Ah well, I suppose I've just been away from . . . ah . . . civilization too long, my friend. I had almost forgotten that such things were sometimes considered necessary. And then, concerning cost—I am a Trader by profession, my boy, and surely there is no need to go into that at present. Although I will say that you might be surprised at the cost. But let me show you what we are talking

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about. Here . . ." He fumbled at his sash and pulled forth several small and variously shaped objects. The nervous guards tensed for a moment and then relaxed when their captain showed no alarm.

"You've already seen and used our translators, my boy. Now this little egg-shaped object is a teleporting device." He handed it to Cheel and held up another. "This cylinder is the control device for the case on which I am now sitting. Watch: I will raise it, now lower it, now move it left, now right. Here, inspect it, but don't try to use it while I'm sitting on the case. Now this tiny box is a personal levitator. Watch." Winslow's bulky form floated free of the case and rose about a meter, his head almost touching the ceiling. He settled down again and handed the box to Cheel. "I have other devices in the case but that should do for now."

"Fantastic! Absolutely fantastic, sir! How do they work?" No longer the military officer, Cheel leaned forward.

Winslow grimaced. "You put me on the spot, my boy. Not that I'm unwilling to explain. It's that I don't think I'll be able to. Your language doesn't yet have the words, and you don't yet have the necessary concepts. Roughly speaking, though, these are mind-matter devices. They have no real power—or shall we say, ability—in themselves. They work in conjunction with the mind to produce whatever effect they were designed for. They aren't machines, as you think of machines. That is, they really don't do anything, so to speak. They really can't. For instance, you couldn't equip one with a switch and a timer, set it, leave, and have the device turn on and then accomplish something. They aren't like that. You simply *do* things with them with your mind. Maybe it would be better to say that you do things *through* them. Am I coming across at all?"

"Not really. You mean like I operate through this recorder," Cheel patted a heavy metal box on his desk, "to perhaps talk to someone somewhere else at another time?"

"Oh ho!" said Winslow, looking at the box. "So we are being recorded"—he glanced at the M.P.'s and their guns, still pointing at him—"as well as guarded. It's been a long time since this old man has been considered so dangerous, my boy. It gives a lift to my ego." He laughed delightedly and sat more erect, brushing back the scanty fuzz above his ears. "Any cameras?"

Cheel smiled and then, with a hint of apology, said, "No cameras. But this is standard operating procedure. I hope you don't mind."

Winslow dismissed it with a magnanimous wave of the scented cigarette he held. "Not at all, son. But back to your question. No, it isn't like operating through a recorder. That is a body-machine relationship and is based exclusively on matter

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and the electromagnetic energy spectrum. These, and our other psionic devices, operate with the mind in another extension of reality. Something that you would be limited to calling the mental universe."

"Magic? The supernatural?" Cheel did not scoff as he suggested it, despite the presence of the soldiers.

"Not supernatural at all, my boy. It is a mode or extension that your own mind exists in. It is supernatural only in the sense that your mind is. Magic? Well, in a way. Symbolism works in peculiar ways in this extension. And, much of what your culture has referred to as magic, undoubtedly was the result of particularly qualified individuals utilizing this extension without the aid of psionic devices, or, at the most, very crude devices. But to call this magic you would have to re-define that term. This sort of thing is not 'evil', of course. I want to stress that. Neither does it involve devils, or spirits, or gods. Get that clear in your mind. You and the devices alone do it, utilizing characteristics which, although peculiar to this extension, are just as natural as fire, or motion, or the solidity of your desk top. By the way, may I ask how this will be accepted by your religious leaders?"

Cheel made a quick motion that was translated by the wand as a shrug. "Who knows? Five hundred years ago you would have been burned as an emissary of Kal. Today we've discarded such ideas. Besides, most nations aren't too religiously oriented anymore." He arose and began to pace back and forth. "But let's get back to these devices. Tell me, sir . . ."

In a few moments Winslow found himself conducting a basic course in psionics, and he and Cheel fell into the roles of teacher and pupil. They bent over the desk, covering sheet after sheet with diagrams and formulas. The guards lounged near the door, bored to distraction as the hours passed.

Finally, Winslow, having reached a natural break in his explanations, walked over to the window and stood for a while, gazing out at the regular rows of dreary barracks outside. Eventually he turned back to Cheel, who was still poring over their notes. He hesitated for a moment and then spoke.

"Tell me, my son: Do you feel you can trust me fairly well?"

Winslow had never needed emotion generators for his games. Cheel thought for a moment and then gave the equivalent of a nod.

"Thank you," said Winslow. "I consider that an honor and a compliment. Then I know I won't be creating any suspicion in your mind if I request that these soldiers be removed for a few minutes and the recorder turned off?" Cheel paused a fraction of a second too long and so Winslow cut back on the magni-

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tude of his request by explaining. "I want to show you a few things and tell you a few things. I'm uncertain about them. I'd like your off-the-record opinions and reactions. It'll be to your advantage and to the advantage of Chk/nil, I promise—as well as to my own. You see, for some reason or other, I trust you also. And I value your opinion."

The captain nodded again. He dismissed the soldiers and flicked off the machine. "I'm probably sticking my neck farther into the noose, my friend. This is an official government interview recorder. It is locked and can't be erased. It already has recorded your request. Now, regardless of what we do, or don't do, or say, the I&CIC boys can infer whatever they choose from this 'off' period."

"I am deeply touched, believe me, that you would agree with that idea in mind. But relax, my son. I wouldn't request something that would put you in a bad light. Remember that your soldiers, not having translator wands, haven't understood a word I've said, and that machine records our voices objectively. You understand me only because you hold a translator. Anyone listening to the recording, though, would hear only a very loud noise at the points where I was speaking. Even if they have a translator wand —which they eventually will have —they wouldn't understand my speech. These psionic devices work through minds, not machines. You would need a translator hooked up to the machine and that wouldn't work. That's why I know so little about your culture. I am very adept with psionics, but I could receive only vague impressions from even your live radio broadcasts. Otherwise I would just have sat out there until I knew all about your culture. That would have made it easier for me. But it wasn't practical, or even possible."

Some of the tension went out of Cheel. He stared at the alien, puzzled. He knew the risks he thought he had been taking by turning off the recorder. The way the I&CIC worked was no mystery to him. He'd seen some of the things they were capable of and he knew their almost paranoiac suspicions of everyone. Why then had he risked turning off the recorder? He continued to stare in silence. The calm being in front of him undoubtedly was not of this world. Perhaps that helped account for his willingness to trust. At least he knew he wasn't a plant, or an enemy agent. Moreover, the alien had given enough evidence that he could not be harmed, or even restrained, against his will. He also probably had the ability to wipe out the entire camp if he were so inclined. Yet here he sat, asking for help.

But his feelings went beyond trust. He already found himself genuinely liking the friendly obese

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stranger. The ingenuous alien actually reminded him of his father. He looked speculatively at the wand in his hand. How much of this came from the Trader and how much did he generate in his own mind with the help of the wand? He didn't know. He knew only that he had missed his father tremendously since the old fellow had died. There was no one now with whom he could have that easy unguarded relationship which had meant so little to him until it was gone. His fellow officers? They were eager to twist any tiny slip of the tongue to their own aggrandizement. Civilians? He despised their obsequiousness and treachery. Thoughts and dreams he believed gone forever once again flooded his mind. Previously there had been no alternative.

He watched the Trader who had now begun pulling additional objects from the open sample case and laying them on the desk top. What did he see in this fat creature who had been born over a hundred years before Cheel's own grandfather, yet who retained a happy enthusiasm and open trust that was missing in Cheel's own age-mates? Did he hear an echo of a distant freedom in the Trader's voice? He wondered what it would be like to be a Trader between the stars.

With difficulty he pulled his attention back to what the old fellow was saying. He had finished with his case and now had it closed again, sitting on it. The two of them talked all through the rest of that afternoon and long into the evening. Shortly before midnight they reluctantly concluded the conversation. They decided that the end of the earlier taped portion could be taken as the end of the interview, since Winslow's portion would be undecipherable. Nothing was added to it. Cheel summoned a courier and had the recorder taken by helicopter to the nearest Imperial Air Force base for delivery to Central Headquarters. There would be no problem unless the I&CIC interviewed the guards and found that the two had been closeted far longer than the tape indicated. Cheel had Winslow escorted back to the guardhouse. A summons was received early the next morning to bring the alien to the capital under heavy guard. Cheel accompanied him on the trip.

As soon as they landed at the capital the captain was hurried off for a lengthy debriefing session and the Trader was whisked away for interrogation under heavy guard. His confiscated goods were turned over to military technicians for study. Even his clothing was taken from him for inspection and tests and he had to suffer through the first day in an itchy robe that fell from his ample paunch barely to his knees.

He had his revenge, though. He used a heavy hand in playing with them. Like a chameleon he took on

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the coloration of all the Chk/nilian castes in turn. The uncomprehending defensive stupidity of the Worker, the endless vapid complaining and naked avariciousness of the Merchant, the obfuscating arrogant pedantry of the Scientist, the bombastic phrasemongering and Machiavellian weaselwording of the Politician, the righteous precisianism and unctuous sanctimony of the Religionist. He stayed clear of the characteristics of his interrogators, however. He preferred to make them fight on his ground.

Winslow enjoyed this sort of thing and was in his glory. Still fresh as a daisy when the first worn team —captains and colonels—was replaced by another—colonels and first-grade generals—he had the opportunity to offer an improved and polished act. They didn't appreciate his artistry. Neither did they appreciate the occasional distant muffled explosion that punctuated his theatrics. They winced at each one. Each marked another unsuccessful attempt by their technicians to open a psionic device in the face of its self-destruct mechanism.

After ten hours of attriting the interrogators, Winslow grew bored and a little tired. It had been a long and full day. He had been threatened with imprisonment and even torture earlier in the interrogation and had countered with the claim that the nervous system of Terrans was notoriously delicate. Any abuse, he told them, might result in a catatonic trance, or even in death. Now, to wind up the party, he proceeded to antagonize one particularly touchy colonel. In fifteen minutes he had him apoplectic. In twenty he had snipped the last strand of the officer's control and the colonel leaped to his feet and struck Winslow across the face. Immediately the Trader rolled his eyes and fell inert to the floor.

There was a stunned silence in the room and then a roar of abuse descended on the hapless officer's head. Winslow twitched once to show there still might be hope and he became the center of solicitous attention. Someone brought a stretcher and he was gently lifted and carried to a quiet room. Medics scurried around for a while, helpless in their ignorance of his life processes. Eventually he was left alone with, he was sure, many fervent prayers for his well-being. He subvocalized for a while with Chuck and then fell into a deep and restful sleep.

The next day he awoke refreshed and a rather hesitant attempt was made at further interrogation. Winslow refused to cooperate and kept demanding an audience with the Emperor. There would be nothing to gain by repeating yesterday's performance. He had accomplished his purpose. When he had first arrived he had been a feared, unknown and dangerous alien enemy. He had assumed each and every characteristic of the other guilds

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that was most despised by the military. Now he was a hated, contemptible, and somewhat asinine, opponent of the type they were used to. They had "domesticated" their image of him. In so doing they blinded themselves to the alienness of his culture and its impact upon themselves.

They finally were convinced there was nothing to be gotten out of him and admitted the audience with the Emperor had already been arranged for the following day. Having won that skirmish, he demanded Captain Cheel be assigned to him as liaison officer. They agreed and left, mumbling to themselves. But Winslow waited in vain for Cheel the rest of the day.

The Trader was ushered into the Court of Chk/nil late the following morning. He was disturbed to find Captain Cheel there. They greeted each other with gestures under the suspicious and curious stares of the several hundred Princes of the Guilds and other dignitaries. Winslow took the other's hand during the greeting and surreptitiously pressed into it a thin wafer. Cheel closed his hand around it and Winslow, already having a translator for the interview with the Emperor, spoke.

"What the . . . I can understand you!" said the young captain. "Have you learned our language already?"

Winslow smiled as he gaped at the immense hall. "We don't necessarily have to make our translators as big as the Handy Herald's Wand model, my boy. It's just that they're a little more showmanlike and harder to misplace in that form. By the way, how did the debriefing go? Any problem with the I&CIC?"

"No. Nobody likes them, and they were allowed only about five minutes with me. I told everyone that you were very close-mouthed, and they seemed to buy that."

Winslow gave a low laugh. He continued to scan the court. It was an impressive sight. Over two hundred and fifty meters long, its multiple rows of gilded pillars converged slightly to focus attention on the throne end, where a pyramidal staircase rose to place the throne dais far above the floor. An elaborate entablement behind the throne was set off by great folded drapery falling from the ceiling high above. Both side walls were covered from top to bottom with crowded murals picturing—from what Winslow could gather peeking between the pillars—the secular history of Chk/nil on the left and a panoply of religious myths on the right. The gaudy paintings ran the entire length of the walls, back to the end of the hall. In the end wall was set a massive carved and inlaid double door fully forty meters high. The waiting audience had not come in by these; they had filtered in through inconspicuous side doors.

Winslow whistled as he looked

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around. "This place must have raised the taxes for a few years when it was built." He was impressed, but also discouraged. The great hall had a certain splendor to it but most of that could be attributed to its size and elaborateness. It was, he decided, stiffly, almost self-consciously, barbaric. It echoed what he had already seen of the art of Chk/nil and he despaired of adding anything truly valuable to his collection. It was the race itself that would serve as the real prize, and he would be content with that.

"Yes, it probably did," said Cheel in a low voice. "And we're still paying off the renovation that the present Emperor finished about ten years ago, when he first took the throne."

Winslow asked Cheel to brief him on the personages that lined the edges of the tapestry-like carpet that stretched from one end of the vast hall to the other. Cheel did so, pointing out various members of the guilds and the court functionaries. He had almost finished when a deep booming sounded and the massive doors began to swing open.

Through them marched rank after rank of pages, clad in black and silver, blowing curved horns and flogging large drums slung from their waists. Soon the hall was filled with an almost deafening din. Just as Winslow felt he could stand it no longer there fell an abrupt silence. On a chair carried high above a dozen bearers came the Emperor. There was not a sound as he was carried the length of the room and up the stairs to the throne. It was quite a dramatic entrance marred only, in Winslow's mind, by a somewhat prolonged installation and calling to order. Eventually one of the distant figures by the throne spoke and the Trader learned from Cheel that he was to be immediately presented to the court, with Cheel as interpreter.

Someone handed Cheel a translator rod and they stepped out into the aisle. Following Cheel's example Winslow crawled forward on hands and knees, having activated his levitator to support most of his weight, to the base of the steps before the throne. There they prostrated themselves until bidden to rise.

There was a lengthy introduction and eventually Cheel motioned Winslow to present his gifts. Winslow looked around to see that his sample case had been carried in and set just behind him. With many a bow he turned and flung open the lid. He cursed softly as he saw half the contents were missing and the rest in disarray. He rummaged and found what he was looking for.

There was a partially suppressed gasp from the court as he whipped out fabric and dramatically whirled it around his body with a bull-ring flourish. It shimmered and highlighted with the dull gleam of the sea otter. The colors of a discreet,

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subdued rainbow wavered in its depths, and it hung in casual folds as graceful as the sweep of a galactic arm.

Winslow closed his eyes and breathed deeply of its living fragrance. He caressed his cheek with it with a reverence only partly feigned. "A product, Potent Highness, of a far-distant world hanging on the edge of the intergalactic void. A lonely world touched by a wistfulness of endless space and a racial glory now only a memory. A sad, green star lights this world and the haunting songs of its people tremblingly pluck at the roots of your being."

He paused to see that he held the court in the palm of his hand. His hushed voice, very appropriately translated by Cheel since the officer had only to repeat what he heard, continued. "They have taken their dreams and their memories and the light of the glowing dust cloud in which their system lies, and which bathes their planet in a dreamlike effluence, and they have woven these things by ancient skills into this cloth. As light as the softest zephyr of spring, as warm and welcome as the touch of a mother's proffered breast to the lips of her newborn."

Winslow draped it over his outstretched arms and, with a low bow, said, "It is yours, Most High One. An insignificant token of my unlimited esteem."

("For crying out loud," hissed Cheel to Winslow, "you don't have to be so phony, do you?" Winslow, surprised, threw him a rapid glance and then murmured, "Shut up and translate. A helluva Trader you'd make.")

An attendant stepped forward to receive the gift. At a motion from the Emperor it was carried to him. He laid it across his lap and stroked it with his long three-fingered hand. Reluctantly pulling his attention from it, he spoke and his minister with the translator repeated the words.

"We have deigned to be aware of your little offering. But come, we also have conquered space and now move rapidly toward conquest of the peoples of space. Soon there will be no world—including your own—which is not under our sway. This bit of cloth will be the most insignificant of the treasures with which we shall flood our world. Such gifts, however amusing, are of little consequence to a warrior people such as we. We concern ourselves with matters of empire. Moreover, it has been said that you bring with you other things which it pleases you to believe may be of interest."

"To be sure, Magnanimous Grace, to be sure. Your wisdom is unsurpassed. It just so happens that I do have here several articles of a more prosaic nature which, since I must earn a living even as the merchants of your own world, could not quite be passed out as gifts—

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except to yourself, of course." He motioned to an attendant and handed him several dozen wands to be passed out among the more important of those present. He waddled forward a little closer to the steps so the generals and princes could see him better.

"It has been my great good fortune to stumble onto the beginnings of an imperial venture destined, Fates willing, to roar outward across the far-flung star fields as a tsunami across the face of the sea. I have seen many races in my wanderings but few have exhibited the energy, the brilliance, the *mana*, as does yours. I beg nothing more than to be able to contribute in some fashion, be it ever so small, to the future glory of your race. In so doing I hope to scavenge a few tiny crumbs from your banquet table."

("Come on, Winslow," gritted Cheel, aside. "Damn it, boy," replied Winslow, "shut up and translate!")

"Now, in the hands of some of you is an item that may be of some passing use to you." The holders of the wands glanced at them. "These are our Mark IV Handy Herald's Wands. A star-conquering race such as yourselves might find them useful in contacts with the alien races soon to feel your power. They save learning inferior languages."

"General?" inquired the Emperor of one of the Military Guild.

The General in Charge, Occupation and Consolidation, stepped forward a pace and genuflected. "There is no doubt, Resplendency, that the learning of an alien tongue could be very difficult in some cases, especially since the vocal organs of the aliens may be of a totally different construction than our own. It will be one of our major problems as we expand."

The Emperor's eyes rested for a moment on the Merchant Princes and then, "It is our pleasure, Trader, that you supply Chk/nil with these wands."

"Thank you! Thank you, Most High Lord," expostulated Winslow, bobbing like a cork in a stream. "I am impressed beyond measure by your magnanimity." He glanced toward Cheel to see the captain staring at him in disgust. Winslow mentally kicked himself. The deculturization and transference had been more sweeping than he had realized. The event was good; his nonrecognition of it was execrable. But there was no chance now to recoup his tarnished image. Too many held the wands and he couldn't even risk a wink.

He next demonstrated the teleporter and almost caused a riot as the captain of the palace guards realized that Winslow could 'port to within knifing distance of the Emperor. It took a few minutes to unpack the guards from around the irritated figure on the throne. Winslow quickly pointed out that his goodwill toward all could be de-

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pended upon for, if he had wished to assassinate the monarch or even wipe out the entire capital, he had already had plenty of chances. He already had succeeded in some measure with his manipulation of the monarch, for it was the Emperor who first saw his point and angrily ordered the others to give the Trader full rein in the demonstration. He even demanded a translator rod over the guard captain's objections.

Winslow did not thank the monarch for the dispensation and did not fawn any longer in his presentation. His image in Cheel's eyes, however, already had been damaged and the young captain was silent through the rest of the interview, his services as translator being no longer needed.

Winslow assured the Emperor, and particularly the I&CIC representative, that any and all teleporters supplied them would be prebiased to prevent teleportation to within five kilometers of the monarch. This naturally was not possible, but Chuck, who still was monitoring the whole show from their ship, could override such 'ports while negotiations were going on. Use of any of the psionic devices could be overridden by a highly talented monitor until the operator became skilled in their use. After skill was acquired, of course, no outside control was possible. By the time this was discovered in Chk/nil, Winslow knew, it would not matter.

Next came the duplicator. It was a ring about as large around as his head, and he unfolded it to form a figure-eight. Borrowing a ceremonial sword and sheath from a staff officer, he theatrically passed it through one of the paired rings. There was a soft moaning of air. As the original sheathed sword passed through one ring, another began to appear below the second ring. Winslow dropped it when his fingers approached the plane of the ring and two identical swords fell to the floor. He handed both of them back to the astounded officer who, in his incredulity, risked death by drawing both swords from their sheaths in the presence of his monarch. No one noticed.

"Your Excellency! Your Excellency!" came a cry from one side of the aisle. It was a member of the Scientist's Guild Cheel previously had pointed out to Winslow as being one of that caste's leading princes.

Annoyed at the interruption, the Emperor acknowledged him.

"Your Highness," shouted the scientist, stepping forward, "I should like to see an end put to this mountebank's sleight-of-hand trickery." There was a growl of approval from his associates. "As I insisted yesterday, the things that this . . . this creature claims to be able to do are completely and totally and irrevocably impossible! They fly in the face of all known and proven nat-

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ural laws. Even if we have been unable to discover his method of deception—although I am certain we would have," he glared at the generals, "had we been permitted access to him—we can be certain that it is trickery and only trickery. Why make all of us laughingstocks by continuing this farce?"

"Interesting point." The Emperor pointed a finger—"You there, General /Non. What do you say? Was your sword duplicated?"

"It was, Supremacy. Right down to a little dent near the end of the sheath."

The Emperor turned again to the scientist. "How might one explain that? This alien certainly could not have seen that sword before—unless we presume an insidious plot of such magnitude that it would have to involve even our beloved and trusted Chief of I&CIC." He waved the startled official into silence as he opened his mouth to protest.

"I do not know," the scientist continued stubbornly. "I haven't the slightest idea as to what happened, thanks to our precious military. But I do know what did not happen. The sword was not actually duplicated by that silly little ring. I also know that the so-called teleporters will not actually work. They emphatically could not do so. If there is one basic law of which we are certain, it is that the matter-energy sum cannot be altered. Where did the matter come from to create that sword? In a like manner, how could the alleged teleporter work? If one were to 'teleport'," he spit out the word as if it had a nasty taste, "to a greater or lesser distance from the center of our planet, energy would be gained or lost. Where is that energy to come from, or go to? Why," he sneered, "if such a thing were possible we would only have to continuously teleport higher, use our subsequent downward movement to drive a machine, teleport upward again, and so on, and we would have the fabled—and utterly impossible—perpetual motion machine." There was laughter behind him.

"Well, Trader?" said the Emperor, turning to Winslow.

"Your scientists are most astute, Excellency. They are well grounded in the basic laws of the universe of matter and energy. Indeed, they are so learned and perceptive it is a matter of great wonder that they have not yet found out how to construct an interstellar ship not using a field space drive, or how to detect such a ship as it hovers in the midst of a mishmash of radar beams above this very court." He turned to grin at the staff officers and noted the equivalent of tight dour smiles on several faces. "Although this is hardly the time or place to hold a seminar, the objections do deserve an answer. The duplicator does not disobey the law of matter-energy content. It merely converts matter. The moaning noise you heard was produced by an equivalent amount of atmospheric mass being drawn

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into the duplicator. That matter was converted into the appropriate form and shape. As to the gain, or loss of energy, as one teleports variously within the gravity well, a similar event occurs. A small portion of air is converted into energy if one teleports higher, and energy is converted into nitrogen and released if one teleports lower."

"Impossible!" snorted the irate scientist. "Utterly and abysmally impossible."

"Impossible also to objectively exceed the speed of light, my dear savant," replied Winslow quietly. "But a moment's reflection will convince you that our ship must regularly do so if we are to stay in any meaningful relationship with our customers or our own culture."

The Emperor expressed his amusement and waved the scientist back. Winslow felt a little sorry for him and his colleagues, but there was a job to be done. Hardly had the prince stepped back, however, when there was a stir and then a swelling chorus of protests from the princes of the Merchant's Guild. It had finally dawned on them just what impact this duplicator would have on the economy, and on them. With difficulty they were silenced by the Emperor and the court officers. Then Winslow demonstrated and described the operation of the transmuter. There was another uproar.

His presentation of the levitators broke the back of any remaining control among the princes of commerce, and the disturbance was almost impossible to quell. The Emperor finally acquiesced to their shouted demands and ordered that sale and use of everything but the translators be limited to the Imperial Armed Forces and supply of the transmuters and duplicators not even to them. But all could see the repressed rage beginning to smolder within the monarch as a result of the princes' almost-rebellious behavior and imperious demands. The merchants had gotten their way for now, but they would have to pay dearly in the long run.

The entire room, by this time, seethed with acrimony and crossfires of accusation and old envies. The Emperor dismissed Winslow and the Chiefs of Staff with strict orders to begin negotiations at once. Winslow and Cheel began to back immediately toward the door. But the Emperor had to roar at the generals to start them on their way. Not only was it unprecedented to leave the court before the monarch, the generals wanted those transmuters and duplicators and, furthermore, they were inclined to stay and get in a few licks of their own in the battle they saw developing.

Exiting to an almost empty corridor, Winslow and Cheel started toward the conference room in a far wing of the palace. The sample case tagged along behind them. The Trader made several attempts to engage Cheel in conversation but

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received only monosyllabic replies. He let him be and they walked on in silence, followed at a distance by the yelling and gesticulating Chiefs of Staff and others.

"Ridiculous!" came the loud voice of the Chief Procurement Negotiator above the hubbub of the conference room.

"Absurd and outrageous!" echoed General Ngn, the O&C commander.

Winslow, perched crosslegged like a stubborn Buddha on cushions on the conference-room floor, gave a shrug of elaborate unconcern and tilted his miniature transmuter. There was a thin whistle as the device sucked in air and converted it to steaming Irish coffee at his mental command. The fragrant stream fell into his waiting cup. He picked it up and sipped noisily. He didn't particularly want anything to drink, but he wanted to keep the transmuter before their eyes. It was something they wanted and couldn't have. He preferred them to think more on that and less on what they were getting.

The A&A Director rubbed his arms with contained fury. "We'd have to strip bare every art museum in the country to meet your demands. You know that, don't you?" He was leaning over the unperturbed Winslow, shouting. "We'd have to strip the Em . . . His Exalted Highness's palace to come up with that amount of artwork!"

"Why art?" snapped the Strategic Space Commander, General Tee'gn. "That's what I can't figure out. Look, you misbegotten idiot, it isn't that *we* care about the obscenity art. For all *we* care you could take every obscenity piece in the whole country for your obscenity levitators and teleporters and we'd feel we were getting them for nothing. It's that . . . Exalted Emperor's liking for it. We're all practical men here. Realists. We're interested in the things that *count* in this world. But we can not give you the value in art that you are demanding. He won't permit it. Look," the crusty old general tried to fall into a wheedling tone and rather botched it, "we are on your side, actually. Don't you see? We're willing—we're eager—for you to have all the art you want. We'd like to get rid of it—except for our victory monuments, of course. But we *can't* give it to you. Come on now. Be a good fellow. Settle for something less, or for something else, and let's get on with it."

The Chief Procurement Negotiator was on his feet again. "Why not credits? Why not gold bullion? Why not diamonds? We'll give you the amount asked for in any of those."

Without answering, Winslow picked up his transmuter again. Immediately it started to spew forth somewhat sketchy reproductions of ancient Spanish pieces-of-eight. "Solid gold," he grunted as he handed them around. Then diamonds as

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large as his thumb began to drop into his hand. "First water," he said, passing them out. "You jokers are going to see, sooner or later, that the only thing I cannot create is creativity itself. Consequently, that's the only thing you can sell me."

There was a surprised hiss of enlightenment from the far corner to which Cheel had retired from the beginning of the conference. No one else noticed it but Winslow gave a quick smile of pleasure. Transference was again about to take place.

"That I understand," said the O&C general, carefully pocketing the diamond. "I don't give a tinker's damn about it, but I understand. You'll get all the art I can get for you. What is bothering me is that full-division demonstration you insist on as a condition of sale. What do you expect to gain out of having a full division equipped in battle array teleport into the parade ground and levitate all over the place in front of the Emperor? I'm no money-grubbing merchant, but I know damned well that request is so far out of the line of standard business practices that it isn't even funny." There was a chorus of agreement from the others.

Winslow examined the end of his scented cigarette for a moment. "General, with all due respect, you would make a rather poor thus-and-so merchant on your own world. And your own merchants wouldn't last five minutes on my world, being used to a captive market as they are. Public relations, advertising, drumbeating—that's what the demonstration is all about. Once he is convinced that he can't get out of showing these things, the Emperor will have every nobleman in the entire country there to show off his new toys. That's going to generate demand for my other non-psionic lines. Maybe," he leered at them with evil glee, "just maybe it will generate enough pressure for psionic devices that you will end up getting some of my other goodies. Ever think of that? But regardless, gentlemen, I am a hard-headed businessman. I wouldn't insist on something that is going to be as much a headache to me as it is to you, unless there was a profit to be made from it now or some time in the future. I must insist on that demonstration."

"Hell with it," snarled Tee'gn, the SSC general, stomping away. At the door he stopped and turned. "Look, we've made out pretty good with the weapons we have. We are loaded with bombs that can wipe out an entire planet. We don't need your little bag of tricks. I don't approve of them anyway. As far as I'm concerned, if you don't like our last offer, you can lump it. I'm sick of the whole thing and I refuse to take part in any harebrained scheme to use our Imperial Armed Forces as cheap entertainment for your benefit!" The door slammed.

Cheel frowned at the outburst.

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Surely General Tee'gn knew that the purpose of war was to subdue and exploit the enemy, not to eliminate him. General Ngn also dismissed Tee'gn's outburst. He made a disgusted sound toward the closed door. He knew that O&C needed the Trader's products and he was going to do his best to see that O&C got them.

Ngn arose and strode over to where Winslow sat. He looked down at him. "I'm just as ready to blow up as he was, Trader. But you have us over a barrel. The thing is, we have you over a barrel, too. You want our artwork, or you wouldn't have spent almost two weeks here. You also want a future market for your other products. Now, if you want to retain any hope of getting these two things, you had better cooperate."

"You are trying, General," smiled Winslow, "but you're forgetting something. You are not my only source, but I am definitely your only source. Not counting the other nations on this planet, there are at least four other potential imperial markets within a couple of hundred parsecs of here."

"What?" bellowed the general. "You mean that you would sell those weapons to our enemies? Listen, you—" He made a quick grab for Winslow's blouse front and felt his hand inexorably slowed to a halt several centimeters from its target. He looked in puzzlement and then made another more deliberate grab. Again his hand came to a halt, slipping a little to one side. He explored the invisible barrier with his fingers. His face slowly became blue with rage. "So! And what is *this*! You obscene slimy worm, you've been holding out on us! How many other tricky little devices do you have up your sleeve that you haven't told us about?"

"Several," admitted Winslow, pouring out more Irish coffee.

The general's anger was chilled by a sudden thought. He gripped the table edge for support. His voice was little more than a whisper. "And how many have you already sold in this volume of space?" He looked like he was afraid to hear the answer.

"None," said Winslow. "But I'll bet I could never convince you of that. Nevertheless, I'll try. Just think of how much more profit I could make by becoming the exclusive distributor for my civilization's products to a rising interstellar empire. Don't you think that would be much easier and more lucrative than hopping about from planet to planet, generating war? Use your head and rest assured that I use mine. Just to put the screws to you, though, I'll say that if your empire doesn't want to expand among these stars, I'm sure I could find another one that did want to do so."

"And you would?" General Ngn's voice was soft in his fear.

Winslow shrugged. "You must understand that I have no loyalty to Chk/nil. I have no loyalty even to

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your race. If I am an alien to you, you most certainly are all aliens to me. I haven't brought this out because, as you well know, I wished our relationship to be friendly and pleasant. Besides," he paused for a moment, although he ignored the muffled snicker from the far corner of the room, "I thought you had realized it. Rather provincial of you not to. You might want to meditate on the situation a bit. Perhaps you will find other aspects of your dependence on me that you've overlooked."

General Ngn gave the equivalent of a bitter laugh. "I fancy you're right, Trader. We'd all prefer not to think about it, I believe." He turned to the others in the room. "Gentlemen, we have accomplished all that we can accomplish here at the moment. I propose we retire and see what we can do toward satisfying this Trader's demands. Any comments before we leave? Fine. Trader, we shall contact you as soon as we have reached some sort of an arrangement. In the meantime, if you require anything, Captain . . . ah . . . the captain here will see to it." He saluted and was followed through the door by the other weary negotiators.

Winslow poured another cup of coffee, looked at it for a moment, then poured it back into the other end of his transmuter. The air into which it was re-transmuted gushed forth and stirred papers scattered over the floor. Pulling himself to his feet, he left the room, followed by his case and Cheel. They walked in silence for a while down the echoing halls, the guards following at a distance. They came to the apartments assigned Winslow. The man opened the door and they entered. He stretched out on the couch and it creaked in its struggle to support his weight. He turned to Cheel. "Well, my boy, what do you think?"

"I don't really know, sir."

"Your conceptual structure a bit shaken by recent observations?"

"Something like that. I'm getting a different view of many things—including you. Do you know that the way you acted in front of the Emperor sort of upset me?"

The fat man chuckled. "Yes, I know. But before you judge too harshly, my son, remember that a man does not become what he does—unless he's convinced he does. I can act the lickspittle without being same. I hope, though, that my image recovered somewhat during this conference?"

"Yes, it did. And that puzzles me, too. I should have been on the side of our generals, but I found myself leaning more toward you."

The Trader smiled and shook his head. "Ah, the powers of images. Life takes many forms, yet we find ourselves everywhere."

"I don't understand."

"I hardly do myself. Nevertheless, I would like to have known your parents. But come—the day's

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work is done. Why should we sit around so seriously?" He turned to his case. It floated up and over to him, its lid opening. Rummaging a moment, he said, "Why spend our few remaining moments of camaraderie in endless speculation? Moreover, you look tired and upset and I am worried for your health. I have hidden here three bottles of an ambrosial liquid, a soother of brows, which it would be blasphemy to duplicate by any device.

"It is a wine—nay, more than a wine. It is an exquisite work of art." He lovingly extracted a reed container from the depths of the hovering case. Slowly turning it in his hands, he lifted it above his head. Cheel brightened perceptibly as his eyes thirstily followed the bottle.

"Witness. Witness, my son, the robes of a living thing. The rustic dress of the soul's delight. Deep, deep toward the throbbing heart of our spinning galaxy, on a world as old as Time itself, lives a race so wise, so ancient, so high, that they have abjured travel among the stars for longer than your race and mine have strode erect. They have reached the Quiet Time and now spend their days in serene pursuit of an elusive perfection impossible for you and I even to guess at. All is aesthetics to them. Through millions of years they have bred and nurtured a plant that surely must once have given suck to the very gods themselves. A plant from which they, by mysterious means, extract and brew a liquid indescribable.

"A bouquet as subtle and variegated as the rainbows of mythical Paradisio, eternally circling the lost sun of Arak. A flavor as delicate as the first shy kiss of a virgin maid. A body as light as the transpicuous mists of the Great Nethusa Nebula. The fruits of Dan, so treasured that men have given their very lives to taste of them, could not compare to the rapture imprisoned by palaeocrystic magic herein. Behold!" he intoned, struggling to his feet and ripping the basketry from the bottle. "Behold, mortal, the Absolute!" Slowly he turned the amber-rose wine in front of Cheel's attentive face. "Saw you ever such a glow in the heart of any jewel? Dare you even presume to offer your insignificant soul in worship to *THIS*?"

Cheel laughed uproariously. "Sire," he said, "I am unworthy . . ."

"Of course you are, my boy," Winslow grunted as he eased back onto the couch. "We're all unworthy, believe me. Notwithstanding"—he popped the cork—"it is a very good wine, with the hidden kick of a spotted mule. And there are several more bottles in the case. Would you be a fine fellow and hand me those two glasses in there? No, not those. Rather the unbelievably magnificent goblets laboriously worked, each from a single diamond worth the ransom of a star cluster, by the incomparable arti-

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sans of distant Aoao. If we don't break them tonight, you can give them to your Emperor tomorrow as a token of your esteem. They're the only two in existence now."

A few hours before dawn Winslow's mind clicked awake. He remained still on the bed where he found himself. As full consciousness returned he felt a throbbing grow in his head and the taste of long-forgotten lint in his mouth. He wondered pathetically why he had not taken a pill before going to sleep. It was the transition between drunkenness and hangover and he felt awful. But something had wakened him. He couldn't reach the pill now, not until he had found the reason for his awakening. He laid inert in the dark room, listening. There was a slight noise somewhere near the foot of the bed, and he briefly wished he had brought a mind-changer as Chuck had advised.

The noise was repeated. It was near where he had put his sample case. Agents of the Religious, or Merchant's castes. Merchant's, more than likely. Surely not the Military. They had already had their crack at his case. He considered awakening Chuck with a call and then rejected the idea. No use disturbing him. There was the sound of heavy breathing and a foot scuffed. They were lifting the trunk.

Winslow waited for a moment while he brought into full recall a picture Cheel had shown him of a particularly nasty-looking carnivore of the southern forests. It resembled a Tasmanian devil and, according to Cheel, had a viciousness, strength and speed which made it the terror of its haunts. Winslow created the image of one in the sample case. He imagined what its young must look like and added a few of those. Then, willing the case to sink back to the floor, he caused the lid to raise. A high, keening chatter came from inside, and from someone's hand a light flashed for a second into the case. Winslow caused the animal image to spring. There was a wild scramble as two shadowy figures leaped for the door. They hit it simultaneously and jammed for an instant in the opening. Struggling free of each other, they clattered down the hall, all thoughts of stealth forgotten.

Winslow hardly had time to slip a tiny pill into his mouth and sigh as it washed out the effects of last night's alcohol before a steward and a brace of guards burst into the room. He spent an hour explaining to a frantic, guilty officer what had happened. He spent another half hour trying to get to sleep in the face of the noise from the soldiers now swarming outside his rooms. As he dozed off he wondered what had happened to Cheel.

A servant answered the bell by his bed later that morning. Winslow handed him a translator and asked for Cheel. He was informed that the young officer's whereabouts

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were unknown but that another officer had been assigned as liaison companion. Winslow wasn't happy to hear that and tried to remember what had been said last night that may have caused the replacement. He had no doubt the rooms were bugged.

He thought some more. To the best of his memory, most of the time had been spent singing dirty songs. But something else. Their earlier discussion of the life of a Star Trader. That was it. Cheel had expressed too strong a liking for the picture Winslow had painted. Even from the Chk/nilians' internalized viewpoint of the situation that would make him suspect. But any insistent inquiry would amplify suspicions. Best to let the whole thing ride for now. He doubted that the youngster was in any serious trouble, except possibly a raging hangover.

The new liaison companion was ushered in. He was a rather uncommunicative, older captain and Winslow did not particularly take to him. However, he did verify that his race got hangovers from overindulgence. Winslow decided against having a pill sent to Cheel. The liaison captain also informed him that there would be another staff meeting in about an hour. Winslow was expected to attend. He groaned, dismissed the captain, and struggled out of bed.

Picking up his clothing and spreading them out on the bed, he touched his valet unit. There was a tiny flurry of activity as all foreign substances were repelled from the clothing. He thought for a moment and then changed the apparent texture to that of the local wool. The color he changed to subdued grays and browns. He created an image of himself in the center of the room and admired it, changing a line a bit here, a fold a bit there. The picture of the portly, serious businessman. Now off to the arena, he mused. One more casting of the Emperor as the Great Problem Solver and the deed would be as good as done. He meditated on pride as he was escorted to the conference.

It was to prove easier than what he had planned for. The Emperor was already there in the conference room. Winslow prostrated himself at the monarch's feet, ignoring the standing generals and officials.

"Get up," said the Emperor. Winslow noticed he held a wand. "We're not going to be playing those games of state today, Trader."

"My humble thanks for your graciousness, Most . . ."

"You can knock that off, too," the monarch said. "We're here on business affecting the future of the Chk/nil Empire and I want to get on with it. We tried the other way with you and it fell flat on its face. You'll find me a little more flexible than some of my generals when it comes to the future of my rule."

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Winslow gave an attenuated bow. "I sincerely appreciate your approach, sir. I'm sure we can come to terms."

"We probably can, now that we've pushed the military into the background. Tell me: Are they all the same everywhere, Trader?"

"I'm afraid they are, sir," said Winslow, grinning at the discomfiture on the faces of the generals.

"What a pity," sighed the monarch. "One should hope that . . . ah, never mind. It's probably just as well for us that they are. If we ever encountered a race having generals with nonmilitary minds, we'd see our empire obliterated. But to go on with the business at hand. I've been informed you demand over ten billion credits worth of our artwork for a thousand each of your wands, personal levitators and teleporter devices. Is this correct?"

"Plus three hundred remote-control levitators that I'll throw in as a bonus if we reach agreement within the next two days."

"I see," the Emperor nodded. "You must realize, Trader, that such a price will just about wipe out our art treasures. You must value our art forms highly."

"To tell the truth, sir," said Winslow, "and at the risk of making you suspect my integrity, I must admit that I set that figure because of the antagonistic tone of yesterday's session and what had gone before. I'll probably end up taking about two million credits worth now that you and I understand each other. Besides," he laughed, "I know that a thousand troops, even if they are equipped with my devices, aren't enough for a major campaign. If I clean you out now, what would you be able to give me for the next million or so?"

The Emperor glared in triumphant accusation at his crestfallen staff. He bowed his head to Winslow. "We thank you. To be honest, as everyone seems to insist on being at present, we must admit that you would have received the full requested amount had you insisted. Our love of beauty inclines us to be grateful. Now," he continued, briskly, "I also have been informed of your desire to briefly train a thousand troops for a war-games maneuver on the palace parade ground, using the equipment you will be supplying. Might I assume you are willing to reconsider this, also?"

"I'd rather not, sir. I really am looking forward to new markets in your empire and I do wish to generate as much interest as I can. This involves publicity, to be sure, and the throwing away of secrecy concerning this equipment. But secrecy is unnecessary. No technology within ten thousand parsecs can break into those psionic devices while the destruct mechanism is activated. You needn't worry about them falling into the hands of enemy nations on your planet, nor of enemy planets. Therefore, since there is no need for secrecy, despite what your

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I&CIC boys undoubtedly will tell you, I must insist on maximum publicity. I would appreciate attendance by all possible nobility and full press coverage."

"And what if an enemy nation, when they hear of our almost irresistible increase in military effectiveness, decides it has nothing to lose now by launching a nuclear attack? We live in the shadow of obliteration as it is."

Winslow cocked his head and appeared to think for a moment. "All right, I shall be more open with you, sir. No atomic device could have been detonated on this planet since our arrival. I hadn't wanted to mention it, but my force shield is not impervious to radiation of that nature and I didn't want to take any chances. I'll leave my own device with you when we leave. It won't stop a pile from functioning, but it will eliminate any possibility of a bomb going off. Here—as a matter of fact, I'll let you wear it right now." Suiting action to words, his magnificent paunch was bared. He seemed to unzip an area of skin and extracted a small square plate from the opening. Refastening the pseudoflesh belt he handed the plate to the Emperor, who glanced quizzically at one of the scientists he had brought with him to the conference.

"Effective over the entire planet?" snorted the prince, looking with disgust at the small object. "Impossible!"

The monarch gave the equivalent of a shrug. "Easy enough to check out. Tee'gn!" he barked.

"Sir!" clipped the SSC general, leaping to his feet.

"General, I want you to leave this room even quicker than you did yesterday. I want you to launch a missile into the Southern Sea Test Area. I want you to do it *now*."

"Well then, we shall see," the monarch said as his general disappeared through the door at a run. "If the warhead does not go off, Trader, you shall have your demonstration. I must insist, though, on having one of your force shields—one of those little things you so absentmindedly forgot to demonstrate to us before. I regret to say that I'm not necessarily loved by every one of my subjects." He accepted a small cylinder that the Trader handed him. "What do I do? Just put these somewhere where they will always be touching me? How do I start them working?" He was fumbling with his robe.

"Yes, sir. Touching your skin is sufficient. To activate the nuclear negator simply concentrate for a moment on warheads melting instead of reacting more violently. The device has a built-in holding circuit that will lock itself, and a small portion of your mind, onto the prohibition. It will stay on until you remove the device from your body, or until you countermand the prohibition. Same with the body shield."

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The Emperor laughed. "Oh, excellent! You astound me, Trader. If you are not a sorcerer, you are the next thing to it. I'm glad I kept my priests away from you. Still, I also have heard that you may have other devices that you haven't mentioned to us. This," he patted his waist, "just about proves it."

Winslow nodded. "I have many more, sir. But I'm afraid I cannot supply you with them just now. You've only been assuming that I am a completely free agent in all matters."

"Free enough, it would seem. But no matter. Our association will be a long and growing one. We already are a hundred times better off with the weapons you've already agreed to give us than we were before. I am encouraged by the impression you give of wanting to do business with us for a long time. I am also relieved to sense that you are not interested in political power."

"If I were I would have had it long ago, sir. I am just a simple Trader trying to do his job and realize some small return from it."

The door burst open and the SSC officer, General Tee'gn, hurried in, panting. He threw himself prone in front of the monarch. "Most Exalted One, it failed to detonate!"

"Trader, you're on," said the Emperor, arising. At the door he turned to the others. "See that this merchant gets what he wants."

Staff kept to themselves whatever opinions they had of their loss of face and extended complete cooperation to Winslow. He spent several days instructing a cadre of officers in the use of the psionic devices. They, in turn, spent a week instructing the troops under them. The instruction phase went smoothly enough and Chuck negated any attempt to teleport to within the reduced limitation of five hundred meters of the monarch.

Some trouble did develop. A few soldiers and several officers disappeared, along with whatever equipment they had with them at the time. Winslow smoothed it over by explaining to the indignant generals that skill in the use of the teleporters depended on practice. It was to be expected, he said, that a few of the soldiers would have exceedingly strong nonconscious desires to be elsewhere—with their families, swimming, just knocking about in some sylvan glade. If this desire were strong enough, it could cause the operator to 'port to that location rather than to his consciously selected destination. Control of these nonconscious directives was easily acquired with practice. Nothing to worry about.

And why had the troops and officers not 'ported back? Well, we can easily suppose that they were a little afraid of doing so, since they had blundered once with the devices. All these little things would be ironed out in a few days.

Staff was not fully satisfied with

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Winslow's bland reassurances, but the explanations were plausible enough that they could not cancel the whole project. They requested cancellation by the Emperor, but they didn't get it. Winslow had involved him too deeply in the role chosen for him for the Emperor to be disturbed by details at this stage of the game. The project was continued, but most of the officers yearned strongly for the Good Old Days of conventional warfare. They were careful to keep the remaining psionic devices under heavy guard when not in use.

At the end of two weeks Winslow and Staff decided that the troops were about as good as could be expected without long and arduous training. Winslow gave up his previous insistence that the troops simultaneously 'port in formation onto the parade ground. It was obvious that trying for that would result in a fiasco. Instead, their commander said, they would 'port *almost* simultaneously in a broken, dispersed formation and simulate an attack against a fortified position. Although Winslow reluctantly agreed to this at the last moment, loudly complaining that it would spoil the effect he was striving for, there were many other trivia he stubbornly clung to and everyone connected with the project gave thanks when the day of the demonstration finally came. Between their confusion with the new devices and their growing rage at the overbearing Trader, they hardly had time to think. It seemed as if he were deliberately antagonizing everyone.

The demonstration to the Chk/nilian nobility was an overwhelming success from the promotional point of view. The office assigned Winslow was flooded with calls and messages and representatives demanding information, or distributorships, or private showings. The structure of the Merchant's Guild cracked under the strain as every prince risked sanctions to deal directly with the Trader. He spent his time that day and the next in arranging an interminable series of open and secret "deals" he knew would never bear fruit. Samples, catalogs, even bare verbal descriptions of his luxury line brought orders totalling hundreds of millions of credits. Finally, early in the second day, the Merchant's Guild panicked and clandestine negotiations were begun for the proscribed psionic devices. The evening of that day brought Winslow the news he was waiting for.

The rattle sounded and Winslow turned from the last of his packing to open the door. Cheel entered and raised his hands in greeting. Winslow handed him a translator and the young captain took it. Walking over to a chair, he threw himself into it and leaned back.

"Well," he said, "the whole city is ablaze and I'm afraid the fire is sweeping toward you."

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"Oh? What do you mean by that?"

There was wry humor in Cheel's voice. "I believe you won't be surprised. Over ninety percent of the 601st has deserted. At least they have disappeared and we have to assume they won't be back. They know what to expect if they do return."

Winslow clucked and shook his head sympathetically. "And when did all this happen?"

"This evening. Just about an hour ago. As you know, after that miserable demonstration of the day before yesterday all the psionic devices were taken away from the troops for good."

"I object to the word 'miserable.' I thought the demonstration was quite a success . . . despite the poor roll call."

"I'm quite sure you do. Nevertheless, this afternoon the storeroom where the equipment was kept was broken into. At roll call this evening only thirty members of the 601st could be accounted for."

"I wouldn't be surprised if they were lost to the Emperor forever, if the truth be known," grinned Winslow. "They were a crew of shifty swashbucklers and I said so from the very beginning."

"Then you knew what was going to happen, didn't you?" Cheel looked around the room for the first time. "You're packing. You're going to leave."

"Yes, to all. And now if you'll excuse me for a moment, I'll pack this last little statuette." He busied himself and then sank with a grateful sigh onto the bed.

Cheel leaned forward. "I believe that there was more to your visit to my world than the desire to trade, my friend. Am I not right?"

"Yes."

"Did you foresee all this? Did you plan it? Can't you see where all this will lead eventually?"

The Trader nodded. "I know even better than you, my son. I've seen it happen on a dozen other worlds similar to yours. In a way I was sorry to bring it about here. It's a long story," he said, waving the other into silence. "I'll do my best to put it into capsule form.

"Many years ago, in the time of my grandfather, my own race was as new to space flight as yours is today. We also had begun to follow the path of conquest. Similar to your own planet, mine was divided against itself and even as we fought races from other worlds we warred among ourselves. There were two great nations on Terra, each struggling for mastery over the other. In their frantic search for new weapons which, unlike the nuclear weapons they possessed, would gain them victory without eliminating both, they speeded research in many fields.

"One of these fields was psionics, new to us at the time and unknown to you until now. Levitation was discovered first, I believe; I forget by which nation. Then translators,

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then several other comparatively minor devices. Finally the teleporters. Soon after these were secretly developed and issued to the troops there was an epidemic of desertions. They were as sick of war as your own troops are."

"Our soldiers . . ." began Cheel.

"Sure, sure. I know. . . . consider it an honor and all that sort of guff. You know as well as I do that that isn't so.

"As I was saying, with the introduction of the teleporter, organized warfare on Terra came to an end. And, if it was impossible on the home planet, you can imagine how long it existed in our interstellar ventures. All fighting ceased and the Terrans who were occupying the planets already conquered were abandoned. The governments and the vast organizational networks which it took to supply and maintain the space fleet had collapsed. We drew in upon ourselves. The shape of human society was being irrevocably altered. The transition was not pleasant.

"Neither was the aftermath of our former interstellar policy. By the time our present psionic space drive was discovered and travel again possible, on a more individual level, our former enemies had rallied. They used what they had learned of war from us and they attacked Terra.

"We were helpless as political units, of course. As a matter of fact, we were not political units any longer. Let us go back a bit. Governments weren't only impossible because the individual was uncontrollable; they were made ridiculous due to the precarious hold on life of the would-be governors. Psionic transmuters made it possible for any knowledgeable person to cook up a miniature nuclear bomb—negators not having been developed yet. If it would be inconvenient to blow up an entire city block to kill an official, one would only have to 'port to his bedroom and . . ." He extended a finger, pointing at a chair across the room. A bolt of what seemed to be lightning leaped from the finger and the chair disintegrated into debris. Cheel yelped and jumped at the sharp report. Winslow continued, unperturbed.

"Not all people went so far, of course. But a sufficient number did. The psionic devices, like most basic inventions, are relatively simple once the principles are understood, and there were tens of thousands of people capable of making them in their own shops.

"The individual had tasted complete freedom at last. The taste pleased most and the dish was on every man's table. A new way of life had been created. After the terrible birthpangs had passed it was a stable way of life. Too stable, some say. Research, development, large-scale industry and other activities requiring great complex organizations faltered and fell and even now,

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after hundreds of years, they are only a shadow of what they once were. Change now comes through contact with new worlds; once psionics are introduced progress pretty much goes out the window."

"But your enemies," said Cheel, intently. "When they attacked your planet, didn't your people rush to defend themselves? Didn't they voluntarily submit again to the grip of the governments they'd been fighting?"

"I'm pleased with your way of putting it. I hold real hope for you. But in answer to your question: No, not at all. Can't you see? That would have been too much trouble."

The captain's face wore the equivalent of a puzzled frown.

"Think, my boy, think! You have studied tactics. If the enemy has superior forces, what do you do?"

Cheel thought for a minute. "Engage him under circumstances where he can't use them all."

"Right. And if he has a superior ship or tank or what-have-you?" prompted the Terran.

"Again, you try to render them tactically useless," said Cheel.

Winslow waited.

The captain gazed out the window for a while and then turned back to Winslow. "I understand. Your enemy possessed organization. You did not. The only question remaining is how you managed it. Should I assume you merely let him take over your world and then carry the devices back with him to his own?"

"Not quite," said Winslow, "although that alone would have done the job. We managed to get a few ships into space. They were loaded with donated levitators, teleporters, transmuters and the like. We strewed them all over our enemies' home planets. That speeded matters up."

"I congratulate you," laughed Cheel. "A delicate death blow."

"It worked out quite neatly."

Cheel leaned back again. "Let me see if I have it right. Once your enemy's organization collapsed, they were in the same situation as yourselves. But there would always be the danger of some other race trying to conquer you all."

"Correct."

"Therefore, you and they have been spreading psionics around the whole galaxy."

"In self-defense. We have a lot of help. It's like a chain reaction, you know. As each race recovers from the first effects it realizes how vulnerable it is to those who do not have psionics. Most races contribute traders. I merely happen to be a member of the race that originally discovered it. There are many other traders of many races combined in this effort."

The captain stared at the far wall, quiet.

"I expect your people to be one of the largest contributors to our ranks," Winslow said.

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There was the sound of many footsteps in the hall. The door rattle sounded once, then again, then continually. The door shook under pounding fists.

Cheel leaped to his feet and then backed nervously from the door. "They've come to arrest you!"

The Trader arose and snapped shut the lid on the last item. "I suspected as much," he said. He moved from box to box, touching each with a ball. As each was touched it disappeared.

Cheel whirled on him. "Sacred Cherg, hurry! That door won't last much longer!"

Winslow stood in the middle of the room. He reached into his shoulder pouch. "Here," he said, handing the other a teleporter. "You'd better use this. It wouldn't be good if you were found here." He smiled as the door trembled under the demanding blows. "That one isn't protected by a self-destruct mechanism. You'll be able to have it opened and duplicated easily. Perhaps you can do it yourself. Anyway, it will give you the jump on everyone else. Maybe you'll be able to make a little money out of it."

"And if I don't chose to?" said Cheel, looking deeply into the other's eyes. "This is the only unprotected one on the planet. I could prevent the holocaust you say it will create."

A crack appeared in the door.

Winslow raised one eyebrow. "Hate to bring you down out of the clouds, my boy, but the others will deactivate in a month or so. You'll just delay it that long. Be selfish. Get rich." He handed Cheel two other objects. "Here's a transmuter and a duplicator, also."

A gun butt appeared through a door panel.

"And now I see it is time for me to go."

As Cheel watched, the fat Trader winked a good-bye and was gone.

The I&CIC police burst into the room.

"Captain Cheel!" one of them said. "What are *you* doing here!"

He had been recognized. No matter, he thought, as he gripped the egg-shaped object and willed himself into his own quarters. He gathered a few possessions and in a moment was standing outside the city under a star-filled sky. No matter. Captain Cheel was no more. And Trader Cheel had bigger things to think about. ■

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Kelly Freas

Experts in the Field

It's by no means always clear at a helplessly nontechnical race is quite adequately capable of defending themselves. For that evaluation, it takes a peculiar sort of expert. . .

CHRISTOPHER ANVIL

Lieutenant Colonel Andrew Doyle glanced around from the crest of the natural amphitheater. In the distance, occasional groves of trees were scattered over the rolling grassland. Far off to his right, a dull metallic glint and a flash of dazzling sunlight told of the planetary-classification base near the wide slow-flowing river. Then he winced, and looked down into the big grassy bowl, where some two thousand large-browed tigerlike creatures, heads tilted back, created a shrieking torrent of noise that instantly set Doyle's teeth on edge, gave him chills and a dizzy sensation, and now and then seemed to set up answering vibrations in his very bones.

To Doyle's right, a tall pale man with a pipe in his hand winced at a high-pitched note that seemed to stop the universe, then sucked in

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a ragged breath, and gestured with the pipe stem.

"To your left, Colonel. See that group watching the machines? It's obvious they're talking. You can *see* they're talking."

About eighty feet away, a knot of angry felines, upright on their hind legs, with sinuously-twitching tails and glittering eyes, looked down the long outer slope at a fleet of big motionless earthmoving machines. Spread out in a thin line blocking these machines off from the hill were two squads of Doyle's troops, their guns unslung and expressions wary.

As Doyle glanced from the machines to the troops, then back to the cluster of angry felines, one of the tigerlike creatures, his expression that of a man halfway through a string of profanity, balled one forepaw into a fist, and slammed it savagely into the other forepaw. Another feline pointed down the hill at one of the larger machines, his expression thoughtful, as if he were talking about the machine's function. The creatures' mouths were moving, and Doyle, though too far away to hear the words, had to admit that it certainly *looked* as if they were talking. But that was only one side of the question.

To Doyle's left stood an impatient group in goggles and coveralls, headed by a burly barrel-chested man with a big black cigar jutting from one corner of his mouth, who glanced impatiently at his watch, turned angrily toward Doyle, and suddenly picked up a tripod with a big cone set at an angle on top, and carried it over.

Doyle fought off the effects of the singing, and forced his dazed mind to yield up facts about the antagonistic sets of individuals who crowded the land scape.

The tall pale man gesturing with outthrust pipe was Al Lindell, head of the planetary-classification unit on the planet, which was known as Marshak III. Lindell, acting under Article 12 of Interservice Regulations, had called Doyle on the screen the day before, and angrily demanded that the Space Force intervene to "stop a planetary grab by Nels Krojac, before we get a war out of it."

Doyle had intently studied the face on the screen, to see a somewhat scholarly-looking man who was obviously boiling mad.

"A *war?*" said Doyle.

"That's right. A planetary war with the inhabitants of Marshak III."

"Who is causing the trouble?"

"Nels Krojac," said Lindell. "He's president of Interstellar Construction Corporation. He's landed a work crew here, before the planet is classified."

"You're calling on me to stop him by force?"

"I am. Under Article 12, I hereby formally request your aid to prevent exploitation of an unclassified

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and, in my opinion, potentially dangerous planet."

"Just a minute, Mr. Lindell." Doyle looked up. "Major Burke—"

A strongly-built officer, standing by a three-dimensional display panel, speaking into a small hand microphone, turned to face Doyle.

"Sir?"

"Change squadron course for Marshak III. Maximum squadron acceleration. Condition Three."

"Yes, sir."

Doyle looked back at the screen.

"You say you expect *war* if the work crew isn't stopped?"

"I do. Experience tells me we're right on the edge of an ugly situation. I can't prove it. I can't even show proof why this planet shouldn't be classified in the A series. The dominant race is a large, obviously powerful and dangerous carnivore. But it has no visible technology or artifacts of any kind. To classify this planet as I think it should be classified, I have to show: a) advanced technological skills; b) complex social organization; c) a highly-developed language. I haven't been able to find so much as a stone ax on the planet, so I can't claim 'technological skills'; their 'social organization' is on about the level of the lion's, so *that* doesn't count; I know perfectly well that they communicate with each other, so it follows that they've got a highly-developed language—but my linguistic analysis experts insist the creatures only make 'simple repetitive sounds' when *I* know they're talking. But I'm not allowed to make a subjective judgment. Classification has to be based on objective facts."

"What makes you so sure the animals are dangerous?"

"These creatures—we call them Marcats—Marshak III Cats, that is—these Marcats are built a lot like tigers. You can't see them without knowing they're dangerous. But it goes beyond that. This planet has things on it that make *Tyrannosaurus rex* look like a lap dog. But they don't bother the Marcats. *Nothing* bothers the Marcats. If the Marcats feel like going for a stroll through a place thick with carnivorous monsters, why, they *go* for the stroll. And all the other carnivores come piling out in a hurry."

"What do you think will happen if the construction work isn't stopped?"

"There's going to be a sudden mess of trouble. The one known art form that the Marcats have is what you might call a . . . ah . . . well, 'community singing.' Hundreds of them get together from time to time, and have a . . . a concert, you might call it. The place where the local Marcats have this concert is at a natural amphitheater in low hills not too far from here. The Marcats like this place. In fact, I don't think it would be too much to say it's sacred ground with them. Well, Krojac Construction plans to level this natural amphitheater to-

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morrow, to start work on a centrally-located Administration Complex for a big rest and refit center they're putting up for colonists using the main-trunk transport route that's going to go right past here."

"And you think the Marcats will retaliate?"

"I *know* they'll retaliate. All hell will break loose. But Krojac and his hired blockheads are so thick in the skull they think the Marcats are just a kind of big pussycat. Krojac figures to grab this planet, run up his big rest and refit complex on the ground and in orbit, and use the planet to get leverage on future outbound commerce and construction in this sector. He made low bid on the R and R contract, and for his purposes this planet is ideal. The maddening thing about it is, I can't *prove* a thing. And I've only got one week till the mandatory deadline for planetary classification runs out. If I can't find some way to prove my point, I'll have to classify this planet A-10: 'Physical environment ideal; primitively dangerous biological entities.' "

Doyle said, "Wait a minute. Why can't you classify the planet as you think it should be classified?"

"Because I have to operate according to very strict rules. These rules were set up to eliminate the natural tendency of a planetary classification man to let his sympathies for the local life forms run away with him. There have been cases where human colonists were turned away because the classification team found the local race lovable, or didn't want the idyllic scenery disturbed. So to prevent false classifications, the rules are ironclad."

Doyle frowned. "So all I can do is to hold the crisis off for a week? Then you'll be forced to classify the planet A-10, Krojac Construction will move in, the Marcats will attack the construction teams, and I'll have to attack the Marcats?"

Lindell looked unhappy. "At worst, yes. But I'm still hoping to straighten this out. If I can prove the dominant local species has a highly-developed language, but has no developed technology or social structure, then we have an anomalous situation, which will justify me in classing the planet in the U series. I've sent for PDA's advanced new linguistics computer, the LC-10,-000. If the LC-10,000 arrives here in time, I'm sure I can straighten out the whole thing. But I have got to keep Krojac Construction from touching off an explosion before the LC-10,000 gets here."

Doyle scowled. "Let's see if I have this straight. This LC-10,000 is a new *linguistics computer?*"

"Right. The LC-10,000 is the ultimate authority on language. It contains the sum-total of all that humanity has ever learned about language. It knows, in absolute and perfect detail, everything about every known human and nonhuman language in the known universe. Its

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receptors are capable of picking up the finest and most complex sounds, of whatever loudness or pitch, without exception. And its micropico-miniaturized directed-pulse quasi-fibril potential circuits, with their sextillions of switching elements cooled in baths of liquid helium—Well, if it's language, believe me, the LC-10,000 will recognize it in a flash. My troubles are over if I can just get the LC-10,000 here. And I've put the request in the strongest possible terms. But meanwhile, Colonel, I have to keep Krojac from leveling that amphitheater. That's the fuse on the bomb."

Doyle nodded. "I'll get in touch with Interstellar Construction."

Lindell looked worried.

"Look, Colonel, Krojac is a shrewd customer. He may say—"

Doyle shook his head. "It doesn't matter what he says. You've formally requested that he be prevented from starting construction work on an unclassified planet. You're head of the authorized PDA classification unit on the planet. Regulations state that I will enforce your ban on unauthorized activities on the planet. I will, therefore, enforce the ban. That's all there is to it."

Lindell looked relieved, thanked Doyle, and broke the connection.

Doyle got in touch with the headquarters ship of the Interstellar Construction Corporation. This turned out to be a gigantic self-contained globular office-building and nerve-center for Krojac Enterprises, Inc. A series of suavely-assured individuals informed Doyle that Mr. Krojac could not be disturbed at the moment, but that if he wished to request an appointment, it would be duly considered by Mr. Krojac's appointments secretary.

Doyle then sent a formal message warning that any construction or earthmoving work on the planet Marshak III had been banned by duly-constituted authority, and he, Doyle, would enforce the ban, using whatever degree of force was necessary.

The message had hardly gone out when a reply, couched in legal phraseology, with references to authorities of all degrees of obscurity, began to come in. This reply ran to sixty-two single-spaced pages, and neither Doyle nor any of his officers could either understand it as it stood, or break it down into anything they could understand.

Doyle promptly sent a second message, warning in tough language that his first message stood unchanged.

A call shortly came on the communicator, and a long-faced individual with lightly-oiled wavy hair introduced himself as "J. Hale Reagan, special consultant to Mr. Krojac." Holding by his thumb and forefinger two slips of yellow message paper, J. Hale Reagan looked at Doyle with slightly raised eyebrows and an expression around the nostrils as if he smelled rotten fish.

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"I'm sorry to say, Mr. Doyle, that these messages of yours are quite unacceptable. I can scarcely believe that a person of your potential rank and attainments would choose to put himself on record in regard to Mr. Krojac in such a fashion."

As Doyle looked on, J. Hale Reagan, against a background of what appeared to be a cocktail party, with a well-known senator just behind his left shoulder, and a Space Force general a little further back, slowly touched the flame of a cigarette lighter to the two yellow slips of paper, dropped them into an oversized ashtray, and looked pointedly at Doyle.

"I couldn't possibly forward such messages to the captain of this ship, and I most certainly will not waste Mr. Krojac's time with them. I think we'd better just forget all this."

Doyle found himself looking at an empty screen. He was in such a frame of mind that he didn't trust himself to do a thing for a minute-and-a-half.

Then he sent for copies of the two previous messages, and changing the wording just slightly, sent a third message that said the same thing.

Doyle's recently-appointed second-in-command, Major Hanford, had apparently witnessed the call to Doyle from J. Hale Reagan on a separate screen, and now said, frowning, "What will happen if Mr. Krojac and his people just ignore the warning?"

"Then I'll stop them by force."

"But I understand Interstellar Construction alone is worth eighty billions. Krojac is supposed to have friends at the top in Planetary Development Authority, the Space Force, and the Government itself. This business on Marshak must be important for him to be there in person. What will happen if he creates a situation where we have to kill him to stop him?"

"Then we'll kill him."

Hanford blinked. "I don't think it's that simple."

Doyle leaned forward, his expression alert. "What do you mean?"

Hanford hesitated, then said smoothly, "A man like Nels Krojac can do a lot to help or hinder an officer's progress in the service. This is plain realism."

Doyle stared at him. "I could find a better word for it than 'realism'."

"Of course, what I mean—"

"The most polite word for it would be 'opportunism'."

Hanford stiffened. "Look here. I must—"

"A more accurate word might be 'cowardice'."

"Wait a—"

"But I think *'bribery'* is probably the best word for it."

Doyle narrowly watched the succession of shades of color pass over Hanford's face. "How is it you're so well informed about Mr. Krojac's finances, Major?"

"They're a matter of common knowledge."

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"Probably they are, among the man's retainers. But how do *you* know?"

Hanford opened his mouth, and shut it again without saying anything.

Doyle said quietly, "Don't favor me with any more worldly wisdom. Just see to it that you obey orders."

"Yes, sir," said Hanford.

At that moment, the communicator buzzed, and a shrewd-looking individual, who introduced himself as a member of the Krojac Enterprises legal staff, put it to Doyle that on the basis of a careful study of the underlying intent of the relevant regulations, Article 12 could not be invoked.

Doyle disagreed flatly.

At once, a bluff friendly fellow named Root came on the screen and explained, man-to-man, that Interstellar Construction would be "over a barrel" if they couldn't start work the next day. "Nels signed the contract to care for these transient colonists on the clear understanding that the planet's classification would be favorable, and would be completed in good time. But this fellow Lindell is dragging the thing out to the limit, and now we've got definite reason to suspect that he's hooked in with S. and O. Enterprises, and is stringing this out just to make trouble. Why, the average planet would have been classified over eighteen months ago!"

Doyle listened patiently, then pointed to Article 12, which required him to back up Lindell.

Root explained that their legal counsel had found that Article 12 actually didn't apply.

Doyle quoted Article 12 verbatim, and it was obvious that it *did* apply. Root shrugged and stated that he was no lawyer.

When Doyle got through with Root, two of Interstellar Construction's legal staff came on the screen side-by-side at the same desk, and while one talked, the other studied Doyle's reaction. Speaking alternately, so that neither one actually committed himself, they put across the impression that a high-paying executive job awaited Doyle if he saw reason, while if he didn't, they would bring him to court on the charge that he had been bribed by a competitor. Moreover, any attempt to block Interstellar would fail. If necessary, Nels Krojac himself would lead his men to work, and the Space Force would never dare try to stop such a prominent, highly-placed man. Moreover, the only way to stop Mr. Krojac and his men would be to fire on them, and the Space Force would scarcely fire on unarmed humans.

Doyle stated coldly that it was his duty to enforce Article 12, and he would enforce it.

Another call came in immediately. A former Space Force officer smiled from the screen, and, in the guise of friendly disagreement with Doyle's interpretation of Article 12,

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got across a clear picture of just how well Nels Krojac could reward a man who got him out of a tough spot. While this was going on, Doyle scribbled a note to his communications officer, who announced, when the next call came in, that Squadron 2337 was now moving into a potential war zone and would henceforth maintain complete communicator silence.

By now, the routine report of the situation to Space Force Headquarters had been routinely acknowledged, and initial plans had been made for what *should* be a simple routine operation. But by now, Doyle was none too sure there would be anything simple or routine about it.

The next day found Squadron 2337 off Marshak III, where an enormous globular ship followed the movements of the squadron with large fusion guns mounted in multiple turrets. An earlier call to Lindell had brought the information that Interstellar Construction was bringing down heavy earth-moving equipment, and showed no sign of paying the slightest attention to Doyle's warning. When Doyle's communications officer tried to contact the big Interstellar Construction ship, there was no response. About this time, a second ship appeared, orbiting the planet, with its guns swinging around to bear on the squadron.

Doyle, at the command console, briefly studied the screen, then hit a number of communicator studs.

"Gunnery officer: Destroy at once every gun that bears on the squadron. Communications officer: Order those ships to answer our call at once or be attacked as planetary raiders. *Vulcan*: Sow your heavy implant missile for convergent attack on the larger of those two ships. *Ranger*: Sow your heavy implant missiles for parallel attack on the smaller of those two ships. *Minotaur*: Go down on Marshak III and set up defense of the PDA base against air or surface attack."

As Doyle spoke, before him on the screen, the brilliant lines lanced out, the two attack-ships swung rapidly apart, and the armed transport dipped toward the planet. On the big globular ship, one of the guns glowed white in answer, and abruptly the whole section around that turret flared red, then white, and puffed out in shreds. All over the huge ship, there suddenly were dazzling spots of glowing red.

"Gunnery officer speaking, sir. All turrets bearing on the squadron have been burnt out. Minor resistance from the larger ship only, sir. No damage to the squadron."

"Good work," said Doyle. "If either of those ships turns to present undamaged turrets, destroy the turrets at once."

"Yes, sir."

"*Vulcan* C.O. speaking, sir. Heavy implant missiles sowed for convergent attack."

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"Implant your missiles."

"Yes, sir."

An instant later, the communications officer spoke up. "Sir, we have the captain of the Krojac *Empire* on the screen."

"Put him on the auxiliary screen."

A small screen to one side flared to life, and a slightly puffy man in a uniform covered with insignia, decorations, and gold braid cried out in mingled anger and disbelief, "Are you insane? Mr. Krojac will—"

From a separate speaker came a clear competent voice. "*Vulcan* C.O. speaking, sir. Heavy missiles implanted. The central section apparently contains an armored citadel. The rest is *el punko junko*. Shall we detonate, sir?"

"In ten minutes detonate all implanted missiles unless countermanded."

"Yes, sir. Detonate all implanted missiles in ten minutes unless countermanded."

On the small screen, the captain of the Krojac *Empire* cried out, "Good God! *What are you doing?*"

"Your ship has been implanted with heavy missiles, which will be detonated unless I countermand the order."

From a separate speaker came another quiet competent voice:

"*Ranger* C.O. speaking, sir. Heavy implant missiles sowed for parallel attack."

"Implant your missiles."

"Yes, sir."

On the small screen, the puffy face above the braid-encrusted uniform suddenly vanished. In its place appeared a broad-shouldered man with dark hair, massive chest, and hard blue eyes, wearing a dark dressing gown with a dragon design on the chest. He looked intently at Doyle, then suddenly grinned. "Tough, aren't you?"

Doyle said coldly, "You have a little under eight minutes till the implants detonate."

A clear voice spoke from a separate speaker.

"*Ranger* C.O. speaking, sir. Heavy missiles implanted. No armor on this ship, sir. Shall we detonate?"

Doyle glanced at a small round clock face where two long thin hands swung steadily around the dial.

"In seven minutes and fifty seconds detonate if not countermanded."

"Yes, sir. Detonate in seven minutes and fifty seconds if not countermanded."

Another voice spoke.

"Communications, sir. We have the captain of the *Star Chaser*—that's the smaller ship. He wants to surrender his ship at once, sir.'"

"Good enough. Tell him to disarm his men, assemble them in the entrance corridor, lock his undamaged turrets, and stand by for boarding."

"Yes, sir."

Doyle touched one of the switches on the console.

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"*Ranger.*"

"Sir?"

"Countermand detonation order. Board, secure crew, and seize. That smaller ship has identified itself as the *Star Chaser,* its captain offers to surrender, and I have accepted. He is to disarm his men, assemble them in the entrance corridor, lock his undamaged turrets, and stand by for boarding."

"Yes, sir. Countermand detonation. Board, secure crew, and seize."

From the auxiliary screen, the hard-eyed attentive face looked out alertly. "You're making a mistake, Colonel. For less than this, I've had guys like you put on the Bemus asteroid census for years."

"You have six minutes and forty seconds until detonation."

"You wouldn't dare detonate."

"Detonation is fully automatic unless countermanded, first by my verbal order, second by action of the missile-officer in immediate command. Countermanding takes time. But there is no question of not daring to detonate. Everything so far has been pure routine, and detonation will be the same."

"You'd be hung from the rafters."

"Visual records will show the menacing attitude of both the *Star Chaser* and the Krojac *Empire,* if these are actually the ships' names. Granting this and other circumstances, I am fully justified in regarding either or both ships as planetary raiders or worse. Detonation will blow your ship into vaporized fragments. If there is an armored central citadel capable of surviving the initial explosion—and it is very doubtful that anyone inside will be alive after detonation—that citadel itself will be destroyed at once by concentrated missile and fusion attack. You have five minutes and fifty-six seconds until detonation."

"And suppose I decide to ignore this whole silly business?"

"You will be destroyed."

There was a silence that lasted several seconds as the hard blue eyes looked steadily at Doyle and Doyle looked steadily back.

Then Nels Krojac laughed. His image vanished from the screen, and after a moment the braid-encrusted ship's captain reappeared.

"Mr. Krojac orders me to yield this ship for your inspection, to provide you with any necessary papers or information, and to satisfy any reasonable demand on your part to convince you that we are not planetary raiders. The ship is not surrendered, however; Mr. Krojac is *not* to be disturbed; and the operation of his business offices is to be disturbed as little as possible, on pain of punitive legal measures."

"I won't accept restraints in examining the ship."

The captain blinked. "Then I'm not authorized to proceed."

Doyle touched a stud on the console.

"Gunnery officer."

"Sir?"

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"Count off the minutes and half-minutes till detonation of that larger ship."

"Yes, sir. Just a moment, sir. Five minutes until detonation."

The captain of the Krojac *Empire* said nothing, but the sweat rolled down his face as he stared at Doyle.

The gunnery officer spoke:

"Four minutes and thirty seconds until detonation."

The Krojac *Empire*'s captain thrust out his jaw.

"Four minutes until detonation.

"Three minutes and thirty seconds until detonation."

"Three minutes until detonation.

"Two minutes and thirty seconds until detonation.

"Two minutes until detonation."

"One minute and thirty seconds until detonation.

"One minute until detonation."

Doyle watched the second hand sweep for the last time around the dial. It was now clearly apparent that the Krojac *Empire* was no raider. When the hand reached "30," Doyle would, therefore, countermand detonation and order a boarding.

At "45" the Krojac *Empire*'s captain moistened his lips. Suddenly he blurted, *"I surrender this ship!"*

Doyle touched a stud on the console.

"Vulcan."

"Yes, sir?"

"Countermand detonation."

"Yes, sir. Detonation countermanded, sir."

"Board that larger ship with a fully-armed search party, determine the identity of the ship with certainty, and examine the ship throughout for any sign that it is a planetary raider."

"Yes, sir. Board, determine identity, and search to see if the ship is a planetary raider."

"The captain has surrendered the ship, and you can make any temporary arrangements with him that seem suitable."

"Yes, sir."

On the auxiliary screen, the hard features of Nels Krojac reappeared, to study Doyle coldly. Doyle broke the connection, and glanced at the main screen. The armed transport had disappeared from direct view, but a green symbol showed its approximate location.

"Minotaur."

"Sir?"

"What's your position?"

"We're at twenty thousand seven hundred feet above the planet, sir, dropping toward the PDA classification-unit base. No trouble so far, sir."

"Good. Let me know when you're set up."

"Yes, sir."

Doyle touched another stud on the console.

A voice said promptly, "Communications, sir."

"Get the PDA classifications-unit chief on the screen."

"Yes, sir."

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Lindell appeared on the screen. "You got here just in time, Colonel. The work gangs are moving their machinery into place right now."

"You mean there's been no change in Krojac's schedule?"

"Not by a hair."

"I see," said Doyle. "Well, I'll put troops down to stop them."

"Fine. That's a relief."

"Have you had any word on your language-computer?"

Lindell beamed. "Yes. The LC-10,000 will be here tomorrow. So the situation is well in hand. This is really the ultimate linguistics computer, and it will extract the linguistics elements from the welter of noise that has my experts baffled. Our trouble, you see, is that the Marcats produce much sound that is . . . ah . . . somewhat at a tangent to what we're interested in. Their art form of vocal singing, for instance, runs largely in the range of 2,000 to 50,000 cycles. Since an acute human ear can detect loud sounds of roughly 30 to 20,000 cycles, you can see that we have some cause for confusion."

"I can see you have considerable cause for *discomfort*. But what's confusing about it? Would aliens speak the same way we do?"

Lindell changed expression. "This is quite a technical matter, Colonel."

Doyle was unconvinced, but nodded. "Incidentally, could you send me the survey and evaluation reports on this planet?"

"I'm afraid they're highly technical, and—"

"I'm not talking about the *linguistics* reports. I'm talking about general reports on how the Marcats live, their planetary distribution, numbers, characteristics, habits, size, weight, and so on. Remember, you've expressed the opinion that we may wind up in a *war* here."

Lindell's face cleared. "You don't want the linguistics reports?"

"I'm perfectly content to leave that to you."

"All right. I'll see that you get copies of the rest."

The *Minotaur* shortly set down on the planet, and Doyle had troops sent out at once to stop the work crews. A savage argument followed, in which the earthmoving machines were stopped only when the troops opened fire.

Then the reports on the planet began to come in.

Doyle gradually built up a mental picture of big-browed tigerlike creatures that roamed the planet like lords of creation, lived in dens or burrows lined with dried grass, could be found in nearly any type of terrain on the planet, and everywhere were left strictly unmolested by the monster carnivores that roamed the globe. Pictures showed grown tigerlike Marcats upright on their hind legs, strolling casually along over rolling fields and hills, obviously deep in conversation, as younger Marcats gamboled

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and played around them on all fours, bounded up trees, and chased rabbitlike creatures that went twenty feet at a bound. Meanwhile huge beasts with teeth like broadswords slunk out of sight, or bolted for the horizon at top speed.

After watching enough of these scenes, Doyle gradually came to the conclusion that Lindell was right. The Marcats *were* intelligent, *did* talk, and *were* more formidable than their teeth and claws suggested. Though how, remained a good question.

One visual record particularly impressed Doyle. It showed a creature like *Tyrannosaurus rex* that blundered out into the path of a strolling Marcat. The Marcat gave it one hard look; the big carnivore collapsed and lay motionless, apparently dead. Now, did the creature suffer a heart attack at the mere sight of the Marcat, or what *did* happen? But the closest examination of the scene showed Doyle nothing whatever to answer the question.

Other scenes showed savage fights, between the Marcats themselves; in these fights no Marcat dropped from a hard look. The fight was with fang and claw, and the scene was thick with blood and flying tufts of fur. But then, human beings used weapons against alien attackers that they hesitated to use on each other.

As Doyle wrestled with the problem, to wind up in the same frame of mind as Lindell, word came that the LC-10,000 had arrived, and would carry out its test shortly.

Doyle went down on the planet, found himself deafened by music like harmonizing bandsaws, while a group of angry Marcats glared at the earthmoving machines, and Al Lindell earnestly assured him that the Marcats *did* talk. Then the burly man with jutting cigar angrily carried over a tripod with cone on top, putting it down so hard that the tripod's pointed feet sank out of sight in the ground.

"There, Colonel. Now, take these earphones, listen to them yourself, and see if *you* think they talk!"

Doyle looked around, to see coming up the hill behind him a huge glittering ovoid covered with outthrust hornlike devices, and drifting along on antigravs beside a tall individual wearing thick glasses, a long laboratory coat, and the dignity of a high priest.

Doyle winced as the Marcats hit another jarring note, then he put on the earphones, and swung the wide end of the cone toward the coveralled humans. He heard a blast of sizzling profanity, turned the device toward some Marcats, who were obviously deep in conversation, and then stood paralyzed at the sounds that came through the earphones. They were complex sounds, but certain dominant notes stood out:

"Quack-quack, quack-quack, quack-quack."

"Peep - peep - peep - peep - peep-peep."

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"Oink, oink, oink, oink, oink."

"Whoo-oo. Whoo-oo. Whoo-oo."

The sounds were unvarying, repetitious, with far less expression than two chickens clucking in a henyard. Unless the part that counted was up above the human range of hearing, no one in his right senses could think of it as "conversation." Dumbfounded, Doyle took off the earphones. Now it was obvious that the Marcats *were* talking. He put the earphones on. Now it was obvious that they *weren't* talking.

Doyle took the phones off, and looked around.

Down in the natural amphitheater, there came a sudden silence. The Marcats rose, stretched, some leaning forward, tails in the air and claws bunched in the turf, others erect, with big furry forepaws flexed and showing muscles. Then the creatures turned to each other, like theatergoers during an intermission, and began to *talk,* forearms across each other's shoulders, gesturing occasionally, grinning, prodding each other in the ribs, and waving to mutual acquaintances. The babble was terrific, deafening. But to Doyle's newly-educated ear, it had a monotonous, meaningless sound.

He stepped forward, to listen to an animated group in front of him. Their voices came across clearly:

"Erkbat. Erkbat. Erkbat. Erkbat."

"Cluck-cluck. Cluck-cluck. Cluck cluck. Cluck-cluck . . ."

"Boomity-boomity-boomity-boomity. Boomity—"

Doyle stepped back. No *wonder* Lindell hadn't wanted to hand over the records of the language analysis. It wasn't that they were too technical to understand. It was that they were so obvious no one could help but understand.

Just now, not far away to Doyle's right, the impressive glittering bulk of the LC-10,000 made it to the brow of the hill, and its multitude of outthrust horns at once swung around and aimed in various directions into and around the amphitheater. Beside it, Lindell was speaking earnestly to the tall lab-coated official who accompanied the computer.

"Is this," Lindell was saying anxously, "a sufficient sample?"

"Amply sufficient."

"Ah . . . there's no chance of the computer . . . ah . . . making a mistaken—"

"The LC-10,000 does not make mistakes."

"But if there are *very high-pitched* sounds—"

"They would be detected."

"There may be signals of some kind—"

"The LC-10,000 is designed to detect sonic signals of *whatever* character."

"I see. Well then it *ought* to be all right."

"The LC-10,000," said the lab-coated figure severely, "is a com-

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puter designed by computers for six generations back."

Lindell looked awed. "I hadn't realized that."

Time passed. The horns swung around to new positions.

Finally the technician glanced around. "The ready-light flashed. The analysis is complete."

There was a sound of tearing paper.

"The LC-10,000 finds that there is no language here, at *whatever* frequency or on *whatever* level. The LC-10,000 has analyzed the totality of vocal sounds, and these are 'simple repetitive syllables'. That is all."

"But—Good God, man!" cried Lindell. "Look at them yourself!"

"That is a purely subjective attitude. I certainly will not take part in any display of childish anthropomorphism."

The impressive bulk of the LC-10,000 turned ponderously to aim itself down the hill.

Lindell said, "If you'll just try again—"

The LC-10,000 specialist spoke pityingly. "Try to compose yourself, Dr. Lindell. Really, your attitude is irrational. The LC-10,000 is the *ultimate authority on language*. You have put the question, and the LC-10,000 has answered it. Now, let's try to be scientific about this. Total vocal analysis reveals no meaningful patterns capable of conveying intelligence, except . . . let's see here . . . this means—Each of these creatures, during the test period, made *its own specific sound*. Conceivably, if the creatures couldn't recognize each other by sight, this could convey the identity of the individual speaking. But believe me, it conveys nothing else. Now then, if there were the slightest indication of really meaningful vocal exchange, I would be only too glad to track it down for you. But there is *none whatever*. If you are so firmly convinced that these creatures have a language, let me suggest that you look for it in the area of visual or tactile signals—"

"We've already tried that," said Lindell moodily.

"Then I'm sorry. Our schedule is crowded. Good day."

The LC-10,000 moved off down the hill, and Lindell turned dazedly to look at the Marcats. Not twenty feet from where Lindell stood, one Marcat banged another on the back as both grinned. The lips of a third Marcat moved, and the other two at once turned to him, then looked simultaneously across the amphitheater at something on the other side. Their lips again moved briefly, and all three started off together.

Doyle watched the scene in exasperation. *Obviously* the Marcats were talking. But every time the matter came down to factual details, they *weren't* talking.

To Doyle's left, an exasperated voice said, "How about it? We're going to flatten this place now or the

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end of the week, one or the other." The way he said it, Doyle got a clear mental picture of the amphitheater converted into a smooth flat mass of fresh dirt.

For a moment, there was a peculiar sense of strain in the air, as if the fabric of things momentarily threatened to come apart.

Doyle glanced along the top of the slope, and there, some eighty feet away, the Marcats who'd been watching the earthmoving machines were now looking at him intently. Doyle looked absently back, asking himself how these creatures conveyed information, and why on earth they should make the simple repetitive noise the LC-10,000 referred to. Why should they want to identify themselves, unless they had something to say?

Suddenly Doyle caught his breath. He walked toward the Marcats, who watched him come with what obviously were puzzled frowns, looks of faint uneasiness, and hints and suggestions of belligerent self-assertion and even menace. Doyle picked the most dominant-appearing Marcat and looked him in the eye. The Marcat seemed surprised, but looked back steadily.

Doyle cleared his throat, forced down his feeling of foolishness, and spoke in a monotonous repetitive tone. "Doyle, Doyle, Doyle, Doyle, Doyle, Doyle, Doyle, Doyle . . ."

The Marcat blinked. "Akran, akran, akran, akran, akran, akran, akran, akran . . ."

Lindell walked over to speak to Doyle, then glanced from Doyle to the Marcat in astonishment.

Doyle formed a clear mental picture of the creature in front of him extending his right paw, and, holding this picture in mind, Doyle went on, "Doyle, Doyle, Doyle, Doyle, Doyle . . ."

For a long moment, nothing happened, then the Marcat slowly stretched out his right paw. And Doyle had a fuzzy mental picture of a human being stretching his arms overhead.

Doyle stretched his arms overhead.

The Marcat beamed in delight, and immediately reached out as if to bang Doyle on the back. Doyle moved fast to stay out of the hospital. Quickly, Doyle formed a mental picture of an inert uniformed figure being helped away by other humans.

The Marcat winced, and Doyle had a mental picture of a dejected tigerlike figure with its head in its paws.

Doyle now created a mental picture of the huge tyrannosaurus-like creature he had seen in the visual records. Next he pictured a Marcat. Straining his powers of visualization to the limit, he pictured the Marcat looking up at the tyrannosaur, which suddenly dropped. Doyle repeated this over and over again.

The group of Marcats watched with interest as the one directly in

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front of Doyle ran his paw along the back of his neck, eyed the sky, looked down the hill, and spotted a rabbitlike creature, that suddenly dropped flat and lay motionless. In Doyle's mind, there formed a picture of the animal's head, then of a brain, then of a net of interconnected nerve cells that changed color and texture. At the same time, he had a mental picture of a tree limb with, at first, one bird sitting on it, then two birds, then a flock of birds sitting on it. At the same moment that he saw the nerve cells change color and texture, he also saw the tree limb break. The mental picture faded out, and the reiterated murmur of "Akran, akran" stopped a moment later.

Doyle nodded. The Marcat seemed to understand this gesture. Then his face took on an angry look, and as he began to speak Doyle got a clear mental picture of the Marcats' amphitheater flattened into a mass of compacted dirt. The Marcat waited with an angry questioning look.

Doyle shook his head, and painstakingly pictured the earthmoving machinery going off the planet. He concentrated so hard on this that he forgot for a moment to repeat his name, but this didn't seem to trouble the Marcat. It beamed, turned to the others, and there was one chaotic moment of babble, then the lot of them were banging each other on the back.

Lindell, watching with a look of desperation, burst out, "Doyle, what in space is going on here? I can *see* you talking to them. But all you say is, 'Doyle, Doyle, Doyle, Doyle.' What *is* this, anyway?"

"I wouldn't claim to have the last word on it, but it looks to me as if you've got a bunch of visual telepaths here."

Lindell looked at them.

"But . . . in that case . . . why do they use their voices at all?"

"Because there's one thing a telepath needs to know as much as anyone else."

"What do you mean?"

"He needs to know *who's talking.* And how is he going to know that just by seeing a picture form in his mind?"

"Then all that repetitious chatter is just—*recognition signals!* Good Lord! No wonder we couldn't figure it out!" Lindell paused as a new aspect occurred to him. He looked at Doyle in amazement. "But if *they're* visual telepaths, and *you* were able to communicate with them . . . then you must—"

Doyle shook his head. "That doesn't make me much of a telepath. It just means they're powerful enough to put an image in my mind, and sensitive enough to detect what I'm trying to get across, once they realize—from my repeating my recognition signal—what I'm trying to do."

Lindell nodded. "Yes, I see. And now we've got a way to get across to them, we can rig up a test to

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prove objectively that they communicate. Then I can classify this planet the way it *should* be classified."

Doyle, worn out, went back to his ship, congratulating himself that he wouldn't have to fight a war with telepathic entities that could kill at an unspecified range by overloading a man's brain circuits.

He was starting to feel like himself again when a call came in from Nels Krojac. Krojac's expression was a little hard to decipher. There was anger in it, plus triumph, and something else that was hard to place.

"Say, Doyle," said Krojac. "I've got a little problem."

"What?" said Doyle warily.

"Lindell got the situation across to the cats down there, and they put it to him that having the R and R center here is O.K., so long as *they* pick the spot. But first, I was supposed to 'talk' to them myself. Well, they gave me a pretty hard looking over, and I got kind of a funny feeling in the head. And . . . ah . . . this contract I made out. It's got a couple of jokers in it. Now every time I start to plan when to spring the trap, the room goes black, I get a ringing in my ears, my hands and feet go numb, and I get a funny swimming sensation. Do you figure this means what I think it might mean?"

"I know one thing. If I were you, I'd spring no legal surprises on them."

"Yeah. Well—How far do you suppose this effect reaches out?"

"You have the unique opportunity to find the answer to that, yourself."

Krojac nodded thoughtfully. "O.K. Thanks, Doyle. If you ever get sick of traveling third class in the Space Force, drop around. I can always use a man with brains and guts. Forty thousand to start."

"Thanks," said Doyle. "If I ever get sacked, I'll think of it."

Krojac grinned and broke the connection.

A little later, Lindell was on the screen.

"I wanted to thank you, Colonel. I was so surprised earlier that I didn't even think to thank you. But now, there's one other thing about this that leaves me dumbfounded."

"What's that?"

"How could you find such a difficult, out-of-the-way answer to this when everyone else failed, including all my experts, and even the LC-10,000 itself—the greatest and most infallible expert in the entire field?"

Doyle laughed. "I had an unseen advantage, Dr. Lindell."

Lindell blinked. "What was that?"

"Everyone else was an expert-in-the-field. But the answer *wasn't in the field.* And that's a situation where a rank amateur has all the advantage. He can look *outside* the field, where the answer *is.*" ■

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BOB SHAW

Burden of Proof

The concept of "slow glass" was great for home decorating—for artistic effects—but the effect on Law was rather on the frightening side . . . when you know the truth will, indeed, out. In ten years . . .

Illustrated by Kelly Freas

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Harpur peered uncertainly through the streaming windows of his car. There had been no parking space close to the police headquarters, and now the building seemed separated from him by miles of puddled concrete and parading curtains of rain. The sky sagged darkly and heavily between the buildings around the square.

Suddenly aware of his age, he stared for a long moment at the old police block and its cascading gutters, before levering himself stiffly out of the driving seat. It was difficult to believe the sun was shining warmly in a basement room under the west wing. Yet he knew it was, because he had phoned and asked about it before leaving home.

"It's real nice down here today, Judge," the guard had said, speaking with the respectful familiarity he had developed over the years. "Not so good outside, of course, but down here it's real nice."

"Have any reporters shown up yet?"

"Just a few so far, Judge. You coming over?"

"I expect so," Harpur had replied. "Save a seat for me, Sam."

"Yes, *sir!*"

Harpur moved as quickly as he dared, feeling the cool rain penetrate to the backs of his hands in his showerproof's pockets. The lining clung round the knuckles when he moved his fingers. As he climbed the steps to the front entrance a preliminary flutter in the left side of his chest told him he had hurried too much, pushed things too far.

The officer at the door saluted smartly.

Harpur nodded to him. "Hard to believe this is June, isn't it, Ben?"

"Sure is, sir. I hear it's nice down below, though."

Harpur waved to the guard, and was moving along the corridor when the pain closed with him. It was very clean, very pure. As though someone had carefully chosen a sterile needle, fitted it into an antiseptic handle, heated it to whiteness and—with the swiftness of compassion—run it into his side. He stopped for a moment and leaned on the tiled wall, trying not to be conspicuous, while perspiration pricked out on his forehead. *I can't give up now,* he thought, *not when there's only another couple of weeks to go. . . . but, supposing this is* it? *Right now!*

Harpur fought the panic, until the entity that was his pain withdrew a short distance. He drew a shuddering breath of relief and began to walk again, slowly, aware that his enemy was watching and following. But he reached the sunshine without any further attacks.

Sam Macnamara, the guard at the inner door, started to give his usual grin and then, seeing the strain on Harpur's face, ushered him quickly into the room. Macnamara was a tall Irishman whose only ambition seemed to be to drink two cups of coffee every hour on the hour, but

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they had developed a friendship which Harpur found strangely comforting. He shook out a fold-up chair at the back of the room and held it steady while Harpur sat down.

"Thank you, Sam," Harpur said gratefully, glancing around at the unfamiliar crowd, none of whom had noticed his arrival. They were all staring towards the sunlight.

The smell of the rain-damp clothing worn by the reporters seemed strangely out of place in the dusty, underground room. It was part of the oldest wing of the police headquarters and, until ten years before, had been used to store obsolete records. Since then, except on special press days, its bare concrete walls had housed nothing but a bank of monitoring equipment, two very bored guards, and a pane of glass mounted in a frame at one end of the room.

The glass was of the very special variety through which light took many years to pass. It was the sort people used to capture scenes of exceptional beauty for their homes.

To Harpur's eyes, the view through this piece of slow glass had no particular beauty. It showed a reasonably pretty bay on the Atlantic coast, but the water was cluttered with sports boats, and a garishly-painted service station obtruded in the foreground. A connoisseur of slow glass would have thrown a rock through it, but Emile Bennett, the original owner, had brought it to the city simply because it contained the view from his childhood home. Having it available, he had explained, saved him a two-hundred mile drive any time he felt homesick.

The sheet of glass Bennett had used was ten years thick, which meant that it had had to stand for ten years at his parents' home before the view from there came through. It continued, of course, to transmit the same view for ten years after being brought back to the city, regardless of the fact that it had been confiscated from Bennett by impatient police officers who had a profound disinterest in his parental home. It would report, without fail, everything it ever saw —but only in its own good time.

Slumped tiredly in his seat, Harpur was reminded of the last time he had been to a movie. The only light in the room was that coming from the oblong pane of glass, and the reporters sat fidgeting in orderly rows like a movie audience. Harpur found their presence distracting. It prevented him from slipping into the past as easily as usual.

The shifting waters of the bay scattered sunlight through the otherwise dismal room, the little boats crossed and recrossed, and silent cars occasionally slid into the service station. An attractive girl in the extremely abbreviated dress of a decade ago walked across a garden in the foreground, and Harpur saw

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several of the reporters jot some personal angle material in their notebooks.

One of the more inquisitive left his seat and walked round behind the pane of glass to see the view from the other side, but came back looking disappointed. Harpur knew a sheet of metal had been welded into the frame at the back, completely covering the glass. The county had ruled that it would have been an invasion of the senior Bennetts' privacy to put on public view all their domestic activities during the time the glass was being charged.

As the minutes began to drag out in the choking atmosphere of the room, the reporters grew noticeably restless, and began loudly swapping yarns. Somewhere near the front, one of them began sneezing monotonously and swearing in between. No smoking was permitted near the monitoring equipment which, on behalf of the state, hungrily scanned the glass, so relays of three and four began to drift out into the corridor to light cigarettes. Harpur heard them complaining about the long wait and he smiled. He had been waiting for ten years, and it seemed even longer.

Today, June 7th, was one of the key days for which he and the rest of the country had been standing by, but it had been impossible to let the press know in advance the exact moment at which they would get their story. The trouble was that Emile Bennett had never been able to remember just what time, on that hot Sunday, he had driven to his parents' home to collect his sheet of slow glass. During the subsequent trial it had not been possible to pin it down to anything more definite than "about three in the afternoon."

One of the reporters finally noticed Harpur sitting near the door and came over to him. He was sharply dressed, fair-haired and impossibly young looking.

"Pardon me, sir. Aren't you Judge Harpur?"

Harpur nodded. The boy's eyes widened briefly then narrowed as he assessed the older man's present news value.

"Weren't you the presiding judge in the . . . Raddall case?" He had been going to say the Glass Eye case, but immediately changed his mind.

Harpur nodded again. "Yes, that's correct. But I no longer give interviews to the press. I'm sorry."

"That's all right, sir. I understand." He went on out to the corridor, walking with quicker, springier steps. Harpur guessed the young man had just decided on his angle for today's story. He could have written the copy himself:

Today Judge Kenneth Harpur—the man who ten years ago presided in the controversial "Glass Eye" case, in which twenty-one-year old Ewan Raddall was charged with a double slaying—sat on a chair in

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one of the underground rooms at police headquarters. An old man now, the Iron Judge has nothing at all to say. He only watches, waits and wonders . . .

Harpur smiled wryly. He no longer felt any bitterness over the newspaper attacks. The only reason he had stopped speaking to journalists was that he had become very, very bored with that aspect of his life. He had reached the age at which a man discards the unimportant stuff and concentrates on essentials. In another two weeks he would be free to sit in the sun and note *exactly* how many shades of blue and green there were in the sea, and just how much time elapsed between the appearance of the first evening star and the second. If his physician allowed it, he would have a little good whiskey, and if his physician refused it, he would still have the whiskey. He would read a few books, and perhaps even write one . . .

As it turned out, the estimated time given by Bennett at the trial had been pretty accurate.

At eight minutes past three Harpur and the waiting newsmen saw Bennett approach the glass from the far side with a screwdriver in his hand. He was wearing the sheepish look people often have when they get in range of slow glass. He worked at the sides for a moment, then the sky flashed crazily into view, showing the glass had been tilted out of its frame. A moment later the room went dark as the image of a brown, army-type blanket unfolded across the glass, blotting out the laggard light.

The monitors at the back of the room produced several faint clicking noises which were drowned out by the sound of the reporters hurrying to telephones.

Harpur got to his feet and slowly walked out behind the reporters. There was no need to hurry now. Police records showed that the glass would remain blanked out for two days, because that was how long it had lain in the trunk of Bennett's car before he had got round to installing it in a window frame at the back of his city home. For a further two weeks after that it would show the casual day-to-day events which took place ten years before in the children's public playground at the rear of the Bennett house.

Those events were of no particular interest to anyone; but the records also showed that in the same playground, on the night of June 21, 1981, a twenty-year old typist, Joan Calderisi, had been raped and murdered. Her boy friend, a twenty-three-year old auto mechanic named Edward Jerome Hattie, had also been killed, presumably for trying to defend the girl.

Unknown to the murderer, there had been one witness to the double killing—and now it was getting ready to give its perfect and incontrovertible evidence.

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The problem had not been difficult to foresee.

Right from the day slow glass first appeared in a few very expensive stores, people had wondered what would happen if a crime were to be committed in its view. What would be the legal position if there were, say, three suspects and it was known that, five or ten years later, a piece of glass would identify the murderer beyond all doubt? Obviously, the law could not risk punishing the wrong person; but, equally obviously, the guilty one could not be allowed to go free all that time.

This was how tabloid feature writers had summed it up, although to Judge Kenneth Harpur there had been no problem at all. When he read the speculations it took him less than five seconds to make up his mind—and he had been impressively unruffled when the test case came his way.

That part had been a coincidence. Erskine County had no more homicides and no more slow glass than any other comparable area. In fact, Harpur had no recollection of ever seeing the stuff until Holt City's electrical street-lighting system was suddenly replaced by alternating panels of eight-hour glass and sixteen-hour glass slung in continuous lines above the thoroughfares. That was several years after techniques had been developed for the mass production of slow glass, or—as it was officially known—retardite.

It had taken some time for a retardite capable of producing delays measured in years to evolve from the first sheets which held light back by roughly half a second. The original material was developed by a glass manufacturer trying to produce a transparency which was both shatterproof and a really efficient insulator. Its unique properties might never have been noticed but for the fact that it was first used—unfortunately for a number of people—in automobile windscreens.

The auto manufacturer concerned spent upwards of half a million dollars trying to find out why one batch of one model had been involved in a statistically improbable number of accidents involving right-hand turns. Expensive as the investigation was, it paid off because retardite became a major industry in a matter of months.

"Scene-stealing" was one of the prime applications, and slow-glass farms sprang up at beauty spots all over the world. A large part of the commercial success of slow glass lay in the fact that there was absolutely no difference, emotionally, between owning a "scenedow" and owning the land which had charged it with light. The occupant of the most airless, glove-tight duplex in a city could look out on pine-clad valleys—and in every important respect they were *his*.

It was also discovered that, for many applications, cameras had be-

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come obsolete. All planetary expeditions, manned or robotic, carried practically weightless retardite slivers of appropriate periods. In any cinematic field, from industrial recording to bird-watching, where large footages had normally been wasted while waiting for an unpredictable key event, short-period slow glass was used instead. The cameras were turned on it—with comfortable hindsight—at the right moment. Spy cameras became tiny flecks of glass which operatives had been known to push into their pores, like blackheads.

But no matter how varied the purpose, all slow-glass applications had one thing in common. The user had to be absolutely certain of the time delay he wanted—because there was no way of speeding the process up. Had retardite been a "glass" in the true sense of the word, it might have been possible to plane a piece down to a different thickness and get the information sooner; but, in reality, it was an extremely opaque material. Opaque in the sense that light never actually got *into* it.

Radiations with wavelengths in the order of that of light were absorbed on the face of a retardite panel and their information converted to stress patterns within the material. The piezoluctic effect by which the information worked its way through to the opposite face involved the whole crystalline structure, and anything which disturbed that structure instantaneously randomized the stress patterns.

Infuriating as the discovery was to certain researchers, it had been an important factor in the commercial success of retardite. People would have been reluctant to install scenedows in their homes, knowing that everything they had done behind them was being stored for other eyes to see years later. So the burgeoning piezoluctics industry had been quick to invent an inexpensive "tickler" by which any piece of slow glass could be cleaned off for reuse, like a cluttered computer program.

This was also the reason why, for ten years, two guards had been on a round-the-clock watch of the scenedow which held the evidence in the Raddall case. There was always the chance that one of Raddall's relatives, or some publicity-seeking screwball, would sneak in and wipe the slate clean before its time came to resolve all doubts.

There had been moments during the ten years when Harpur had been too ill and tired to care very much, times when it would have been a relief to have the perfect witness silenced forever. But usually the existence of the slow glass did not bother him.

He had made his ruling in the Raddall case, and it had been a decision he would have expected any other judge to make. The subsequent controversy, the enmity of sections of the press, the public,

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and even some of his colleagues, had hurt at first, but he had got over that.

The Law, Harpur had said in his summing up, existed solely because people believed in it. Let that belief be shaken—even once—and the Law would suffer irreparable harm.

As near as could be determined, the killings had taken place about an hour before midnight.

Keeping that in mind, Harpur ate dinner early then showered and shaved for the second time that day. The effort represented a sizable proportion of his quota for the day, but it had been hot and sticky in the courtroom. His current case was involved and, at the same time, boring. More and more cases were like that lately, he realized. It was a sign he was ready to retire, but there was one more duty to perform—he owed that much to the profession.

Harpur put on a light-weight jacket and stood with his back to the valet-mirror which his wife had bought a few months earlier. It was faced with a sheet of fifteen-second retardite which allowed him, after a slight pause, to turn around and check his appearance from the back. He surveyed his frail, but upright, figure dispassionately, then walked away before the stranger in the glass could turn to look out.

He disliked valet-mirrors almost as much as the equally popular truviewers, which were merely pieces of short-term retardite pivotal on a vertical axis. They served roughly the same function as ordinary mirrors, except that there was no reversal effect. For the first time ever, the makers boasted, you could really see yourself as others saw you. Harpur objected to the idea on grounds he hoped were vaguely philosophical, but which he could not really explain, even to himself.

"You don't look well, Kenneth," Eva said as he adjusted his tie minutely. "You haven't *got* to go down there, have you?"

"No, I haven't *got* to go—that's why I've got to go. That's the whole point."

"Then I'll drive you."

"You won't. You're going to bed. I'm not going to let you drive around the city in the middle of the night." He put an arm round her shoulders. At fifty-eight, Eva Harpur was on a seemingly endless plateau of indomitable good health, but they maintained a fiction that it was he who looked after her.

He drove himself into the city, but progress through the traffic was unusually slow and, on impulse, he stopped several blocks from the police headquarters and began to walk. Live dangerously, he thought, but walk slowly—just in case. It was a bright warm evening and, with the long daylight hours of June, only the sixteen-hour panels slung above the thoroughfare were black. The alternating eight-hour

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panels were needlessly blazing with light they had absorbed in the afternoon. The system was a compromise with seasonal variations in daylight hours, but it worked reasonably well and, above all, the light was practically free.

An additional advantage was that it provided the law enforcement authorities with perfect evidence about events like road accidents and traffic violations. In fact, it had been the then brand-new slow-glass lighting panels in Fifty-third Avenue which had provided a large part of the evidence in the case against Ewan Raddall.

Evidence on which Harpur had sent Raddall to the electric chair.

The salient facts of the case had not been exactly as in the classic situation proposed by the tabloids, but they had been near enough to arouse public interest. There had been no other known suspect apart from Raddall, but the evidence against him had been largely circumstantial. The bodies had not been found until the next morning, by which time Raddall had been able to get home, clean himself up and have a night's sleep. When he was picked up he was fresh, composed and plausible—and the forensic teams had been able to prove almost nothing.

The case against Raddall was that he had been seen going towards the public playground at the right time, leaving it at the right time, and that he had bruises and scratches consistent with the crime. Also, between midnight and 9:30 in the morning, when he was taken in for questioning, he had "lost" the plasticord jacket he had worn on the previous evening, and it was never found.

At the end of Raddall's trial the jury had taken less than an hour to arrive at a verdict of guilty—but during a subsequent appeal his defense claimed the jury was influenced by the knowledge that the crime was recorded in Emile Bennett's rear window. The defense attorney, demanding a retrial, put forward the view that the jury had dismissed their "reasonable doubt" in the expectation that Harpur would, at the most, impose a life sentence.

But, in Harpur's eyes, the revised legal code drafted in 1977, mainly to give judges greater power in their own courts, made no provision for wait-and-see legislation, especially in cases of first-degree murder. In January 1982 Raddall was duly sentenced to be executed.

Harpur's straightforward contention, which had earned him the name "Iron Judge," was that a decision reached in a court of law always had been, and still was, sacrosanct. The superhuman entity which was the Law must not be humbled before a fragment of glass. Reduced to its crudest terms, his argument was that if wait-and-see legislation were introduced

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criminals would carry pieces of fifty-year retardite with them as standard equipment.

Within two years the slow-grinding mills of the Supreme Court had ratified Harpur's decision and the sentence was carried out. The same thing, on a microscopic scale, had occurred many times before in the world of sport; and the only possible, the only workable solution, was that the umpire was always right—no matter what cameras or slow glass might say afterwards.

In spite of his vindication, or perhaps because of it, the tabloids never warmed to Harpur. He began making a point of being indifferent to all that anybody wrote or said. All he had needed during the ten years was the knowledge that he had made a good decision, as distinct from a wrong one—now he was to discover if he had made a good decision, as distinct from a bad one.

Although this night had been looming on his horizon for a decade, Harpur found it difficult to realize that, in a matter of minutes, they would *know* if Raddall was guilty. The thought caused a crescendo of uncomfortable jolts in his chest and he stopped for a moment to snatch air. After all, what difference did it really make? He had not made the law, so why feel personally involved?

The answer came quickly.

He was involved because he was part of the law. The reason he had gone on working, against medical advice, was that it was he, not some abstract embodiment of Webster's "great interest of man on earth," who had passed sentence on Ewan Raddall. And he was going to be there, personally, to face the music if he had made a mistake.

The realization was strangely comforting to Harpur as he moved on through the crowded streets. Something in the atmosphere of the late evening struck him as being odd, then he noticed the city center was jammed tight with out-of-town automobiles. Men and women thronged the sidewalks, and he knew they were strangers by the way their eyes occasionally took in the upper parts of buildings. The smell of grilling hamburger meat drifted on the thick, downy air.

Harpur wondered what the occasion might be, then he noticed the general drift towards the police headquarters. So that was it. People had not changed since the days they were drawn towards arenas, guillotines and gallows. There would be nothing for them to see, but to be close at hand would be sufficient to let them taste the ancient joy of continuing to breathe in the knowledge that someone else has just ceased. The fact that they were ten years out of date, too, made no difference at all.

Even Harpur, had he wanted to, could not have got into the under-

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ground room. Apart from the monitors, there would be only six chairs and six pairs of special binoculars with low magnifications and huge, light-hungry objective lenses. They were reserved for the state-appointed observers.

Harper had no interest in viewing the crime with his own eyes—he simply wanted to hear the result; then have a long, long rest. It occurred to him he was being completely irrational in going down to the police building, with all the exertion and lethal tension the trip meant for him, but somehow nothing else would do. *I'm guilty,* he thought suddenly, *guilty as . . .*

He reached the plaza in which the building was situated and worked his way through the pliant, strength-draining barriers of people. By the time he was halfway across sweat had bound his clothes so tightly he could hardly raise his feet. At an indeterminate point in the long journey he became aware of another presence following close behind—the sorrowful friend with the white-hot needle.

Reaching the untidy ranks of automobiles belonging to the press, Harpur realized he could not go in too early, and there was at least half an hour left. He turned and began forcing his way back to the opposite side of the plaza. The needle point caught up with him—one precise thrust—and he lurched forward clawing for support.

"What the. . . !" A startled voice boomed over his head. "Take it easy old-timer." Its owner was a burly giant in a pale blue one-piece, who had been watching a 3-D television broadcast when Harpur fell against him. He snatched off the receiver spectacles, the tiny left and right pictures glowing with movement like distant bonfires. A wisp of music escaped from the earpiece.

"I'm sorry," Harpur said. "I tripped. I'm sorry."

"That's all right. Say! Aren't you Judge . . ."

Harpur pushed on by as the big man tugged excitedly on the arm of a woman who was with him. *I mustn't be recognized,* he thought in a panic. He burrowed into the crowd, now beginning to lose his sense of direction. Six more desperate paces and the needle caught him again—right up to its antiseptic hilt this time. He moaned as the plaza tilted ponderously away. Not here, he pleaded, not here, *please.*

Somehow, he saved himself from falling and moved on. Near at hand, but a million miles away, an unseen woman gave a beautiful, carefree laugh. At the edge of the square the pain returned, even more decisively than before—once, twice, three times. Harpur screamed as he felt the life-muscle implode in cramp.

He began to go down, then felt himself gripped by firm hands. Harpur looked up at the swarthy young man who was holding him. The handsome, worry-creased face

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looming through reddish mists looked strangely familiar. Harpur struggled to speak.

"You . . . you're Ewan Raddall, aren't you?"

The black eyebrows met in puzzlement. "Raddall? No. Never heard of him. I think we'd better call an ambulance for you."

Harpur thought hard. "That's right. You couldn't be Raddall. I killed him ten years ago." Then he spoke louder. "But, if you never heard of Raddall, why are you here?"

"I was on my way home from a bowling match when I saw the crowd."

The boy began getting Harpur out of the crowd, holding him up with one arm, fending uncomprehending bodies away with the other. Harpur tried to help, but was aware of his feet trailing helplessly on the concrete.

"Do you live right here in Holt?"

The boy nodded emphatically.

"Do you know who I am?"

"All I know about you, sir, is you should be in the hospital. I'll call an ambulance on the liquor store phone."

Harpur felt vaguely that there was some tremendous significance in what they had been saying, but had no time to pursue the matter.

"Listen," he said, forcing himself to stand upright for a moment, "I don't want an ambulance. I'll be fine if I can just get home. Can you help me get a cab?"

The boy looked uncertain, then he shrugged. "It's your funeral."

Harpur opened his door carefully and entered the friendly darkness of the big, old house. During the ride out of town his sweat-soaked clothes had become clammy cold, and he shivered uncontrollably as he felt for the light switch.

With the light on, he sat down beside the telephone and looked at his watch. Almost midnight—by this time there would be no mystery, no doubt, about exactly what had happened in the Fifty-third Avenue playground ten years earlier. He picked up the handset, and at the same moment heard his wife begin to move around upstairs. There were several numbers he could ring to ask what the slow glass had revealed, but the thought of talking to any police executive or someone in City Hall was too much. He called Sam Macnamara.

As a guard, Sam would not know the result officially, but he would have the answer just the same. Harpur tried to punch out the number of the direct line to the guard kiosk but his finger joints kept buckling on impact with the buttons, and he gave up.

Eva Harpur came down the stairs in her dressing gown and approached him apprehensively.

"Oh, Kenneth!" Her hand went to her mouth. "What have you done? You look . . . I'll have to call Dr. Sherman."

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Harpur smiled weakly. *I do a lot of smiling these days,* he thought irrelevantly, *it's the only response an old man can make to so many situations.*

"All I want you to do is make me some coffee and help me up to my bed; but first of all get me a number on this contraption." Eva opened her mouth to protest, then closed it as their eyes met.

When Sam came to the phone Harpur worked to keep his own voice level.

"Hello, Sam. Judge Harpur here. Is the fun all over yet?"

"Yes, sir. There was a press conference afterwards and that's over, too. I guess you heard the result on the radio."

"As a matter of fact, I haven't, Sam. I was . . . out until a little while ago. Decided to ring someone about it before I went to bed, and your number just came into my head."

Sam laughed uncertainly. "Well, they were able to make a positive identification. It was Raddall, all right—but I guess you knew that all along."

"I guess I did, Sam." Harpur felt his eyes grow hot with tears.

"It'll be a load off your mind all the same, Judge."

Harpur nodded tiredly, but into the phone he said, "Well, naturally I'm glad there was no miscarriage of justice—but judges don't make the laws, Sam. They don't even decide who's guilty and who isn't. As far as I'm concerned, the presence of a peculiar piece of glass makes very little difference, one way or the other."

It was a good speech for the Iron Judge.

There was a long silence on the line then, with a note of something like desperation in his voice, Sam persisted, "I know all that, Judge . . . but, all the same, it must have been a big load off your mind."

Harpur realized, with a warm surprise, that the big Irishman was pleading with him. *It doesn't matter any more,* he thought. *In the morning I'm going to retire and rejoin the human race.*

"All right, Sam," he said finally. "Let's put it this way—I'll sleep well tonight. All right?"

"Thank you, Judge. Good night."

Harpur set the phone down and, with his eyes tight-closed, waited for peace. ■

We have been asked where Analytical Laboratory votes, Brass Tacks and Reference Library letters should be sent. The answer is: **Analog Science Fiction/Science Fact, Editorial Office, 420 Lexington Avenue, New York, New York 10017**

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Unsafe at High Speed

One of the predictable consequences of crash programs of any sort is that somebody will forget something, some idea won't have time for adequate testing, unforeseen or unforeseeable consequences will pop up in service, instead of in research.

The crash program for safety in cars—people suddenly becoming conscious of the fact that cars kill more people than cigarettes do, even if the antitobacco alarmists were completely right—was bound to turn up bugs.. You can't make crash-program changes in any complex system without hatching a few bugs somewhere in the woodwork.

Expectably, General Motors has been the be-bugged victim of a crash-hurryup safety program; the energy-absorbing collapsible steering-wheel system turned out to be collapsible under unintended conditions.

There are, now, screams that the automobile companies are dragging their heels in saying they can't introduce all the safety-device changes the politicos say they should install right-away-quick.

If the car manufacturers do what the legislators command them to do—who's going to accept responsibility for the inevitable goofs? Anyone want to bet the politicos who command their crash-hurry installation will acknowledge their responsibility for the resultant crashes?

Of course not! It'll all be the fault of those mercenary, uncaring, wicked manufacturers who dragged their heels and refused to install safety devices in the first place, and didn't adequately test their equipment on the proving grounds before foisting it on the public, won't it?

Moreover, since "the nut that holds the steering wheel" is the primary cause of accidents, give him a solid statement that now his car is not only safe on the road, but has been rendered crash-proof, so that he won't get hurt even if he does have a crash—and man, watch him go! Now he knows that even if he *does* have a crash, he's safe in the arms of GM—or other manufacturer—and he won't feel so constrained to exercise caution.

May I suggest that the legislatures follow the precedent they set with that far less lethal thing, the cigarette, and require that every automobile have an illuminated panel built into the dashboard saying: "WARNING: AUTOMOBILE DRIVING IS HAZARDOUS TO YOUR HEALTH."

That's one safety device that could be installed on a crash-program basis without danger of unexpected accident-causing failure. THE EDITOR.

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One of the distinguishing characteristics of an intelligent race is the use of an abstract-symbol communication system. But we know so little about even our own language . . . and less still about the abstract concept "language"!

LAWRENCE A. PERKINS

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Language is an impenetrable mystery, and English is probably the world's most mysterious language. Yet English is one of the global languages. Hundreds of millions of men rely on it to convey their most complicated hopes and aspirations. Scientists even attempt to transpose it into the precise mathematical language of computers. A few lonely grammarians even attempt to understand it.

The origin of language is a completely closed book. The several competing theories dubiously suggest the derivations of half a dozen words by their proto-human inventors, but no such theory does much more than explain the adventitious vocabularies of certain pet animals.

It might be worth a moment to look at something which is definitely *not* language: tonally meaningful noises. Dogs have some half dozen, including the growl and the snarl. Cats have twice as many, as well as an uncanny ability to learn human intonations. The primeval human meaningful sounds are now largely masked by language, but there are several—including the *ha* or *aha* of surprise, the *hm-m-m* of perplexity, the *ah* of admiration, and the *oh* or *ow* of pain or disappointment.

Further primeval human sounds are the gasp of shock, the grunt of acceptance, the longer grunt of pleasure—exactly the same, interestingly, as the pleasure grunt of the dog—laughter, and weeping. This search into human communication noises is a necessary part of the inquiry into language, as it establishes that humans still possess essentially the same communications medium as do the other higher animals—and that it is not speech.

Speech—a complex system of information-conveying vocal sounds—is uniquely human. No human culture anywhere on earth has failed to develop an intricately structured language. Perversely, it is the most primitive peoples who have the most involved languages. After two centuries, European grammarians have not unraveled all the mysteries of Tasmanian—a circumstance of no consequence to native speakers of Tasmanian.

From all available evidence, languages become simpler as they develop. It now appears that Chinese, presently a completely uninflected language, once had case endings—and the proto-Indo-European language from which English is remotely descended had sixteen cases. Finnish still has twenty or more.[1]

Obviously we still do not understand our primitive languages. Alas, we do not understand modern languages either. All linguists agree that the Indo-European languages are parallel descendants of one parent language—and then proceed to give wildly different interpretations to obviously parallel developments. The Russian *moi*, the German *mein*, the French *mon*, and the Spanish *mi* are all accepted as adjectives—

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but most grammar books attempt to transmogrify the obviously parallel English word *my* into a pronoun. But of this, more later.

English teachers purvey nonsense with a smile. The defenseless student is traditionally told that there are three tenses in English—and then he spends the rest of his life wondering at the obvious difference between *I read* and *I am reading*. Actually there are fourteen basic English tenses,[2] with at least twice as many modal forms.

It is in translation from one language to another that lapses in linguistic comprehension are most painful—and most dangerous. Dangerous because only a person thoroughly familiar with both languages can be certain that he has conveyed the exact meaning. In fact, precisely the translators who are truly bilingual most frequently despair of a translation that will carry everything that the writer intended into a second language.

Even the so-called picture without words, or with only one or two words, presents a translation problem. I particularly recall an occasion when I covered an Austrian political demonstration, taking pictures, and later was called on to translate the placards into English. One elaborate banner displayed only two words: *Ja* and *Nein*—literally, *Yes* and *No*. The "translation" was four lines long, explaining a pun any German-speaker who saw the display would recognize.

All too many translators fail at a very elementary level. The jacket for a recent release of Kurt Weill songs baffled me momentarily with an improbable phrase: "There was brandy laughter on the floor." Then I glanced at the German original and all became clear. *Brandy Lachen* could indeed mean *brandy laughter*, but in this instance it obviously meant *puddles of brandy*.

The blooper of all time, probably, was made by the translator of children's stories who misread the French word *fourré* as *verré* and thereby gave the English-speaking world Cinderella's glass slipper. In the original, of course, the slipper is fur-lined—and much more practical as footgear.

Obviously there is a need for a breakthrough of some sort, and modern transformational grammar seems to be attempting to fulfill that need. Transformational grammar, however, seems to be based on an attempt to program the English language into a computer; certainly the basic instructions to the transformational grammar student closely parallel the published experiments on programming computers to produce English sentences. Discarding traditional parts of speech such as nouns and verbs, the transformational grammarians attempt to list all the words in English in pattern classes, so that words randomly selected from baskets one, two, three, and four will produce a rational sentence.

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The transformational grammarians are interesting, but in trying to fit computer-type rules to one language they ignore the whole millennial sweep of language development. They place the verb *be*[3] in a category separate from all other verbs, for example, because it has a few more forms than do other modern English verbs. The briefest of examinations of this verb in a few other Indo-European languages demolishes this notion: the idiomatically English exceptions vanish in other languages—which in turn have their own equally outrageous exceptions.

If a breakthrough into a fundamental understanding of language is necessary, I herewith offer two entirely subjective experiences of mine as a basis for that breakthrough. And I submit that the theory which naturally arises from an interpretation of those experiences comes close to explaining a great deal about the behavior of human language.

The first of these experiences relies on the fact that my memory ranges unusually far back into childhood. Under appropriate stimulus, I have clearly remembered dozens of things which took place before my third birthday. These memories are in the form of tableaux rather than of a connected series of events, but they are extremely vivid.

For example, I clearly remember the first time that I was really hurt, and as a second scene I remember the frightening first-aid session in which the whole family competed to bandage my wound. Running along the sidewalk, I had tripped over a flagstone thrust upward by the roots of a tree. I still remember the color of that tree, the angle of the flagstone, and the surprising and astonishing sensation of pain when my head struck that tree trunk. Equally vividly I remember the smell of the antiseptic, the greenish light of the desk lamp under which I was examined—green glass lampshades still make me nervous—the worriedly whispered advice, and the fact that the cure hurt a great deal more than the original injury.

I mention all these details because young adult inquiry elicited the fact that I was about two and a half years old at the time of the accident. I had verified a number of these precocious memories by the time I was eighteen years old, including several major presents and the names of the guests at my second Christmas, and the appearance of the stroller with which I learned to walk.

During my first six months in Vienna, before I had acquired a working knowledge of German, my desperate attempts one afternoon to communicate with a native to find out where I should get off a streetcar served as a mnemonic trigger to recall such a tableau. I pain-

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fully remembered an occasion when I desperately—and futilely—tried to communicate with my nurse. I knew exactly what I was trying to say—but I did not know the words. Perhaps I should say that I did not know the English words.

In view of the consensus of modern psychologists that abstract thought without words is impossible, my baby experience should be interesting. I had just discovered that each of my eyes transmitted a separate image to my brain—although at that time *brain* was one of the words that I lacked—and that the images were different. Using every word then at my command, I completely failed to communicate. And yet I submit that a concept such as binocular vision cannot be expressed, or comprehended, without words.

The second subjective experience which I would like to discuss stems from my period of maximum language saturation. I had acquired conversational ability in German and was in the middle of a crash program to learn Russian when I was transferred to Italy. For a month or two I had four languages bouncing around in my head, two of them imperfectly learned. At home I spoke German with my wife, at the office I spoke English with my colleagues, and everywhere else I spoke such Italian as I could muster. Russian continued to haunt me, particularly when I found myself groping for an as yet unlearned Italian word.

From time to time I was uneasily aware that my subconscious mind distinctly formed a verbal concept and then began casting around for an appropriate spoken language equivalent. It was then that I decided that I must have my own private, individual language locked secretly away inside my skull, and that I was achieving interpersonal communication in any one of my four spoken languages by means of intracranial translation.

Objective proof of such a hypothesis is hard to find, but a few years after my language saturation episode I was fascinated by the unqualified statement by the most literate adult who had known me as an infant that, a few weeks before I began speaking English, I seemed to have invented my own language. Although nobody could understand me, I would patiently repeat the same glossolalial remark two or three times syllable for syllable.

At the other end of the spectrum, during World War II for a few weeks I shared a barracks with an elderly gentleman who was a strictly monolingual American—except that in his sleep one night he burst out with a statement in some unknown tongue. I was startled enough to counter with "What?"—whereupon he repeated the statement, syllable for syllable. Awakened, he had no idea what he might have said—or in what tongue.

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At this point I would like to point out that all babies, when they first begin speaking the vernacular, do so with highly pronounced accents —so much so that there are often hot arguments as to what, exactly, really was baby's first word. I need only point out that Baby's pronunciation of his own name often survives as a family nickname—and then point out the hundreds of family nickname variants of ordinary names.

A final datum: my eldest son, in his infancy, pronounced *milk* "mik." Due to the civilian shortages of World War II, he saw his first glass of tomato juice when he was four years old. He stared at the unfamiliar fluid in the familiar container fixedly for nearly a minute and then confidently declared "Bik!"

The inference which I draw from these data is that every normal human evolves his own private language as a natural part of his development, just as he develops teeth and hair. Shortly after he begins using his private language, he realizes that everyone else speaks something else and sets himself to the lifelong task of translating his own interior speech into the vernacular.

This interior speech, although not directly accessible to examination, almost certainly accepts not only sounds but conscious vernacular words, just as English accepts *sauerkraut* from German and German accepts *checkup* from English. The baby's *bik* suggests a quite sophisticated process at work—the stem *-ik* for potable beverage as a classifier, and initial consonants *m-* and *b-* to distinguish between beverages.

Unfamiliar situations, such as the baby's glass of tomato juice or the physicist's coherent light beam, call forth into the vernacular a word from the language well of the subconscious. Children's games are particularly rich in such coinages; I dimly recall having produced dozens of them in my own childhood, and that they were instantly accepted by my playmates. The child is obviously far closer to the heart of language than is the most erudite adult linguist.

I began this article by stating that the origin of human speech is a closed mystery, and the proof, or disproof, of any theory is not subject to laboratory investigation until someone builds an operational time machine. But inasmuch as every current theory flatly contradicts every other theory, is it unreasonable to strike out afresh and assume that the human language instinct is at the root of human speech?

The baby's *bik*, spontaneously coined by the language instinct, was immediately comprehensible; as a matter of fact, in this instance it was treasured and adopted by the whole family until the baby's babyhood ended. Is it at all difficult to believe that proto-humans—guided

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by the same evolving instinct, and treasuring a growing collection of mutually comprehensible speech sounds, used this same word-coining process?

Endless vistas open. Could structural problems explain why some American children fall naturally into correct English grammar and usage while their siblings sometimes fight a lifelong and losing battle with the problem of expressing themselves literately in the vernacular? Human languages vary astonishingly; could it be that the advantage is to the child born into a culture whose language is most like his own?

The fact that languages really differ, or even that there really are different languages, comes as such a complete surprise to inhabitants of large land areas where a single language predominates, such as the United States or the Russian Socialist Federated Soviet Republic. The American confronted by a speaker of an unfamiliar language habitually raises his voice higher and higher in a subconscious belief that this odd other person simply had not heard him. The Russian speaker, even more parochial, fails to understand even the most familiar name if it be ever so slightly mispronounced. Could this linguistic confrontation have any part in the Cold War?

Languages do differ. The difference between languages, even between languages in our own Indo-European family, is startling. Old English and classical Greek, in addition to singular and plural number, had a dual form: we two, you two, and they two. There are a few fossil echoes of this ancient trait of our language in our adjective-pronoun *both* and in the interesting difference between our prepositions *between* and *among*. And yet, language being the mystery that it is, it is not too surprising to find dual number in the Polynesian languages —of which, more later.

The native English speaker is startled to learn that every noun in the other European languages has gender—that in Spanish, for example, *book* is masculine and *table* is feminine; in German, *book* is neuter and *table* is masculine; in Russian, *book* is feminine and *table* is masculine. Continentals are equally baffled to learn that English manages to get along without gender except for such words as *man* and *woman* which express biological sex.[4]

Still safely within the Indo-European family of languages, the Englishman, the Frenchman, and the German get a number of rude surprises when they look into Russian. They are startled, for instance, to discover that the nominative plural is used for indefinite plurals such as *some* and *many*. In actual counting, numbers from two to five take genitive singular, six to ten take genitive plural, and higher numbers progressively alternate thereafter by fives.

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These western Europeans are even more startled to discover that the past tense of Russian inflects by gender: *byl,* I (masculine) was; *byla,* I (feminine) was; and *bylo,* I (neuter) was. (*Y* here represents the Cyrillic letter yeree, which looks like the figure 61 and sounds like the first intimation that one is about to become very, very sick.)

But the real surprises of Russian are more basic. To the Russian, every verbal concept is either perfective or imperfective—either completed or incompleted. Every verbal concept in Russian, therefore, requires at least two verbs—one perfective and one imperfective. Many verbal concepts in Russian also require a third verb to indicate that an action is usual or habitual. The English verb *walk*, for example, has three entirely separate conjugations in Russian: *idti* (to be in the act of walking), *paidti* (to have completed the act of walking), and *khodit'* (to walk frequently or habitually).

The same phenomenon turns up in the closely related Czech language—but the idiomatic differences are so numerous that the Czech has almost as much trouble with this aspect in Russian as would our Englishman or German.

If Russian is surprising, a completely non-Indo-European language such as Japanese is nothing less than amazing. Except for the pronominal additive *tachi* which turns *I* into *we*, there are no plurals in Japanese—or in Chinese, for that matter. The same Japanese or Chinese sentence could just as easily mean "The man sees the horse," "The men see the horse," "The man sees the horses," or "The men see the horses." Number, if not otherwise indicated, must be guessed at.

The American or European supposes that all conjugations shape the verb into the usual grammatical persons: I see, thou seest, he sees. The Japanese conjugation does no such thing. Every Japanese verb fits all persons; conjugation in that language is a matter of sorting into degree of politeness and into positive and negative statements. *Hanashimasu* (moderately polite)

CORRELATION OF WORDS IN SELECTED INDO-EUROPEAN LANGUAGES

Sometimes they are extremely similar . . . . and sometimes completely different.

ENGLISH	cat	one	two	three	ocean	dog	girl	woman
GERMAN	Kater	eins	zwei	drei	Ozean	Hund	Maedchern	Frau
RUSSIAN	kot	odin	dva	tri	okean	sobaka	devushka	zhenshina
SPANISH	gato	uno	duo	tres	océano	perro	muchacha	mujer
ITALIAN	gatto	uno	due	tre	oceano	cane	ragazza	donna
FRENCH	chat	une	deux	troix	océan	chien	fille	femme

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means "I (or you or they) speak;" *hanashimaseng* (same politeness degree) means "I (or you or they) do not speak."

Case does not exist in Japanese except that certain particles added to nouns—and a noun must be followed by a particle—give a sense which can be translated almost exactly into Indo-European cases: *wa* gives nominative force; *wo*, accusative; *ni*, dative; and *ni*, genitive. The case-particle relationship breaks down, however, with *to*, which is a conjunction, and *ka*, which is a sort of spoken question mark.

Chinese and Japanese, however, have been influenced in some degree by Indo-European languages ever since Roman times, and *vice versa*. Russian, for example, also has a highly useful question mark word; in asking "Does he know?" the Russian can easily indicate whether "he" or "know" is the question, whereas the Englishman must use special intonation or underline one of the words to be clear. Conversely, the well-known *a so* is an obvious borrowing from the *ach so* of German—although to indicate the German's turn of surprise or perplexity the Japanese must add *desu* (exists) *ka* (question mark).

For a language totally different from Indo-European, one must look to such languages as American Indian and classical Hebrew. Particularly the American Indian languages seem odd to a person of Anglo-European culture, and until recently most of them were considered untranslatable. They are still so exotic that members of certain tribes are regularly assigned to the Signal Corps upon joining the Army; their radio conversations "in the clear" confound the enemy with an uncrackable code.[5]

Navaho, like Russian, has separate verb forms for related verbal concepts, but on a completely different basis. The idea *handle*, for instance, has one form for the handling of living objects, one for the handling of long objects, one for the handling of textile or flexible objects, one for the handling of containers with their contents, and one for the handling of burdens.

Navaho also has aspect, as does Russian, but with a much richer selection of forms. Navaho has durative (over a long time), perfective, usitive (the habitual of Russian), repetitive, iterative (brokenly repetitive), optative, momentaneous, progressive (more like the Russian imperfective aspect than the progressive tenses of English), transitional, conative (frustrated action), continuative, distributive, diversive, reversative, and many more.

Classical Hebrew[6] has no tenses at all in the Indo-European sense, but it does have a wealth of aspects. Seven forms are possible, although few verbal concepts use all of them: simple, simple passive, intensive active, intensive passive, intensive re-

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flexive, causative active, and causative passive. The intensive is particularly difficult to translate into Indo-European languages; by doubling the middle consonant and varying the vowel pattern, Hebrew changes its verbs so that, for example, *to kill* becomes approximately *to kill brutally*, and *to break* becomes *to break into pieces*. But the intensive of *to learn* can mean *to teach*.

The intensive reflexive of Hebrew is even more difficult to translate. The flaming sword at the gate of Eden "turns" in the intensive reflexive, and Enoch "walks" with God in the same aspect a few words before God "takes" him. But *shave* in the intensive reflexive merely means to shave one's self, or to have one's self shaved.

Edmund Wilson finds that the most striking feature of classical Hebrew is the manner in which verbs conjugate by changing vowels in a rigid consonantal shell, somewhat after the manner of such strong English verbs as *sing, sang, sung*—with a further change to the noun form *song*. And he admits himself stunned by such idiomatic rules as the one whereby after the conjunction *and* the perfective is written for the imperfective and the imperfective for the perfective.

Hawaiian is another thoroughly non-Indo-European language, and the fact that it has been deluged with Eng'ish words does not seem to have affected its grammar. I am frankly handicapped by the fact that the many missionary-published Hawaiian grammars attempt to squeeze Hawaiian into the procrustean bed of English grammar and usage, precisely as English has suffered under the hands of those attempting to force English into obedience to the rules of Latin.

This type of wrong-headedness might be instructive for our later look at what the Latinists have tried to do to English. For one thing, Hawaiian has been forced into the Roman alphabet—where it uses a mere handful of letters—when a syllabary[7] would obviously have been more appropriate. For another, half a dozen of the particle prefixes are construed as forming an "objective" case—that way-station to a language in which all case endings are vanishing absolutely unique to Modern English. The same people find a "possessive" case, and no language, English included, has ever at any time had a "possessive" case. This idiotic blunder will be discussed elsewhere.

Russian, as well as Latin, casually omits the verb *be* in ordinary sentences. Even Eng'ish occasionally does without it, as in such exclamations as "Truman elected? You don't mean it!" or "Joe dead? But he was here an hour ago!" (The omission is in the first sentence in each example, not the second.) Hawaiian permanently does without the verb *be* on a similar basis, and also avoids *have* by using particle

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prefixes to show a possessive relationship.

Hawaiian verbs are completely uninflected; *hana* always means *work* or *do*. Persons and tenses are indicated by particle prefixes, and objects are rendered by particle suffixes. The *oe* of the famous song title "Aloha Oe" therefore means approximately *to thee* or *for thee*. *Aloha* is a peculiarly rich verb meaning, among other things, *greet*. Depending on the nature of the greeting, *aloha* might mean anything from *hello* to *hurrah* to *farewell*. The song title is generally agreed to mean "Farewell to Thee," but only in context with the remaining words of the song.

Returning to the Hawaiian language generally, several of these particle prefixes can be construed as providing the equivalent of the Indo-European nominative, genitive, accusative, instrumental, and ablative cases, but such interpretations are obviously only approximations and should be used only as an aid to the Indo-European in his first encounter with the language.

The variants of language, both in structure and utterance, stagger the imagination. The natives of the Kalahari Desert of Africa speak a language consisting mostly of clicks and grunts, and the Hottentot language consists so principally of two basic sounds that the German colonists gave it its European name: *Die hott und tott Sprache*; in other words, to the Indo-European Germans, the language sounded like endless permutations of the two sounds *hott* and *tott*.

And yet, for all of the fabulous differences between human languages, probably no combination of two or more such as French and Cree, English and Choctaw, Greek and Phoenecian, Swahili and Dutch, Japanese and Korean, has not been mastered for all practical conversational purposes by at least one six-year old human. The human child, equipped with the instinct to generate his own private language, is further blessed with the ability to translate that language into the vernacular with an ease which is usually the envy of his parents.

The human infant is born with a grasping instinct which enables it to clutch an adult finger with such force that the baby can be lifted into the air—apparently a holdover from arboreal prehistoric days. Baby held on to mama tightly or—splat! The ability to hold on for dear life is no longer a survival trait for *Homo sapiens*, and in normal infants this ability disappears within a very short time.

The normal human infant is also born with a language-learning instinct which begins to appear when the infant has fully mastered his speech sounds—only a smattering of which, interestingly, are used by any human language—and vanishes in the pre-teen years. Older humans must learn foreign languages laboriously and seldom achieve flu-

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ency; in our own culture, an American adult who in infancy has learned a substandard dialect has more trouble learning good English than any eight-year-old has in learning a completely new language.

Is it not easier to believe that the phenomenal language-learning ability of children—grasping one or more languages in less time than it takes an adult with all his wealth of information to gather a minimum of the same data—is due to the fact that the child individual language is at least partially conscious of his own internal language, rather than writing off the poor performance of the adult as the result of selective mental deterioration?

This article began with the statement that English is probably the world's most mysterious language. It is true that Anglo-Europeans still have only the vaguest ideas about Tasmanian and Esquimau, while Etruscan and Inca are virtually closed books. The Phaistos Disc, obverse and reverse, is inscribed with a language which remains completely unidentified. However, these languages have been studied only by an esoteric handful of archeologists. When Michael Ventris cracked Minoan Linear B in 1952 and proved it to be an archaic form of Greek, who other than a handful of scholars even noticed?

English, on the other hand, has been studied by billions, and every year sees the publication of a dozen texts on English grammar. But does this mean that any two knowledgeable instructors really accept any of the hundreds of grammar texts? More bleakly, does anybody really understand English?

Historically, English is probably unique among languages; it is certainly unique among living languages. A fully inflectional language in 1050, it had five cases: nominative, genitive, dative, accusative, and prepositional. Most nouns had strong plural forms: the plural of *bok* (book), for example, was *bek*.

With the Norman Invasion in 1066, English quickly became a language of serfs and slaves. Any Englishman of quality spoke either Norman French or Latin, or both. (Latin remained a spoken language among educated Europeans as late as the Elizabethan age.) Speaking English was a mark of low caste, and no serious scholar would have dreamed of doing such a thing. The last written appearance of Old English was probably the final entry in the Anglo-Saxon chronicle in 1154.

Towards the end of the thirteenth century, after the final break between England and Normandy in 1244, English again began appearing among the upper classes in England, and it is possible that Edward I spoke it habitually. Henry IV (1413-22) in particular seems to have urged English as the national language, writing his own personal letters in that language. But even these dates reveal a dark century in

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which no educated person spoke or studied English, and it was precisely in this century that some of the crucial changes in English took place.

Middle English, when it appeared as a literary language, had almost completely lost its inflectional system. Chaucer still observes a dative case by adding an "e" to nouns, but the modern reader can completely ignore case endings and understand him perfectly. The French plural with "s" became the regular plural in English, and the importance of case inflection dwindled. Case inflection does not occur in French, and a century of Norman French got Englishmen out of the habit of needing it except for pronouns.

With the exception of a smattering of genitives such as "a dollar's worth," "a day's work," and "a week's wages," there are only two cases in modern English: the case of the subject (nominative) and the case of the object (objective). But a two-case language is intolerable to the Latinists, not to mention the agony that the messy genitive leftovers cause them. Desperately casting around for at least a third case, the Latinists hit on the possessives —my, your, his, their, et cetera— and pontificated that they constitute a "possessive case."

I feel quite strongly about this particular bit of idiocy because my futile efforts to equate this "possessive" with the real genitive of German blocked my progress in learning that language for several months. When my instructor finally discovered what was the matter, he all but rolled on the floor in an excess of hilarity—as well he might have. The Romance, Slavic, and Germanic languages—including Old English—agree that the possessives are adjectives and not case forms: French, which never at any point in its history has used case forms, has a full set of possessives.

Some English grammarians, recognizing that there is no "possessive case," try to write the whole thing off as genitive; but, with the above noted smattering of exceptions, genitive in English is dead. Furthermore, there really is a set of possessive pronouns—mine, thine, yours, theirs, et cetera—although I have never seen a grammar or a dictionary which distinguishes them. No native speaker in his right mind, of course, would say "This is mine book," or "That book is my."

The genitive-possessive mess is only one of the unresolved problems in English. English is one of the global languages, and hundreds of millions speak it either as their native tongue or as a means of supranational communication. But I have yet to see any two English grammar books that agree even on all the essential points about our frustrated bastard language of Low German and Norman French, overlaid with a threefold patina of Latin[8] and seasoned with a vocabulary drawn from virtually every language on earth.

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Having mentioned the problems of transcribing English and other languages into computers for the purpose of machine translation, it would be frivolous to conclude this article without suggesting a possible breakthrough based on my language theory. If humans translate from one language into another through the medium of a private individual language, what might not be gained by giving the computer its own private language? Vietnamese is able to exist on monosyllables, but perhaps computerese should consist of dissyllables—each word denoting only one concept, and each concept denoted by only one word. It would be worth trying.

In conclusion, basic scientific research spends billions of dollars every year on projects so arcane that from time to time the halls of Congress resound to uncontrolled laughter when our august representatives hear about one of them. Would it not be reasonable to finance a modest project to find out exactly what we English-speaking peoples are talking?

FOOTNOTES

[1] I remember all too clearly the shock with which I tried to absorb the concept of a language with sixteen cases. I still find it a bit thick, but I have since found the six cases of modern Russian a distinct help in imagining six*teen*. The six Russian cases: *Nominative*—the naming case; the case of the subject. *Genitive*—the case of possession and other special relationships. *Dative*—the case, generally, of indirect objects. *Accusative*—the case, generally, of direct objects. *Instrumental*—the case, generally, describing the means of doing. In Russian, "I went by train" or "I went with my brother" would require instrumental for *train* and *brother*. *Prepositional*—certain prepositions such as *about* take the instrumental. In "I thought about my *brother*," *brother* takes the prepositional case.

Latin, another six-case language, uses the four of the above cases and two others: *Ablative*—the case of removal or direction away. *Vocative*—the case in which the speaker addresses the person spoken to. It could be argued that English forms a vocative case by placing the particle *O* before a word of address, as in "O reader, I salute you."

[2] The fourteen basic tenses, demonstrated here with the verb *see*:

	past	*present*	*future*
(simple)	I saw	I see	I shall see
emphatic	I did see	I do see	(lacking)
progressive	I was seeing	I am seeing	I shall be seeing
perfect	I had seen	I have seen	I shall have seen
perfect progressive	I had been seeing	I have been seeing	I shall have been seeing

Each of these tenses is different from any other—and the whole system is largely misunderstood. The simple present tense, as in "The sun shines," extends for several gigayears into both past and future and so is really more an aspect than a tense; it is a statement of generic fact. The exact sense of momentary action comes through the progressive, where the present form "The sun is shining" refers to the actual moment of *now*.

[3] The remarkably idiomatic character of the verb *be* in various languages has long intrigued me. Among the many preposterous variants are the Italian and Spanish forms wherein the concept is ar-

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bitrarily split into completely separate verbs: *ser* and *estar* in Spanish and *essere* and *stare* in Italian. Very roughly, *ser-essere* is a purely linking verb and *estar-stare* is a verb of place location. Yet at least Italian recognizes *essere* and *stare* as the same word giving both of them the same past participle *stato*.

In Russian, *be* is the only verb in the language to have a present tense in the perfective aspect—otherwise reserved for finished and completed acts which obviously must be either in the past or the future. In ordinary statements, it vanishes: The Russian say not "I am here," but simply "I here." Further oddities of this vanishing verb are noted elsewhere.

Could it be that the verb *be* becomes so irregular in every language because it is used so much more than any other—and is, therefore, most exposed to linguistic drift?

[4] There are still a few gender nouns for inanimate things in English. *Ship, country, state*, and *city* are regularly feminine, even if we do louse things up by calling our native country our fatherland. *Moon* is usually feminine and *sun* frequently masculine. James Joyce regularly uses *soul* as feminine, possibly looking back to the indisputably feminine Latin *anima*.

[5] This discussion of American Indian languages is condensed from chapter eleven of Weston La Barre's "The Human Animal"—which is strongly recommended to anyone seriously interested in human language.

[6] Edmund Wilson, "In First Reading Genesis," *The New Yorker*, May 15, 1954, pp. 130-160.

[7] Some languages such as ancient Egyptian and modern Japanese are based on whole syllables rather than on individual sounds. Japanese, for example, is based on seventy-two such sounds, and two of the three sets of Japanese writing systems consist of seventy-two symbols to represent these sounds. Judging by the number of characters used, the Inca language used a syllabary: the secret of the written Inca language was lost when alphabet-oriented Spaniards asked the Inca priests "Which letter is A? Which one is B?" and then put most of the Inca writings to the torch.

The nature of Hawaiian is patently syllabary. Just as the name *Baltimore* turns up in Japanese as *Barachimoru* as the best possible arrangement of the sounds of that language, *Merry Christmas* turns up in Hawaiian as *Mele Kalakimaka*. My own name transliterates into Japanese as *Perukinsu;* in Hawaiian, as *Pelekinaka*.

[8] Latin heavily influenced English on three separate occasions: when Latin-speaking missionaries arrived in Britain in the sixth century, when vernacular Latin influenced the language in early Middle English times when the nobility began speaking English again, and in the sixteenth century when scholars began coining "inkhorn words" from Latin to enrich English vocabulary—which had understandably suffered during the century when English was used almost exclusively for such remarks as "Hey, Joe! Where do we plant the turnips?" Actually the patina is fourfold; modern scientists greatly prefer Greek and Latin roots to English when they invent words.

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MIKE HODOUS

Dead End

Among educational opportunities should be the opportunity to make the same mistake we did . . .

Kiirnemar Kluus lowered his centaurlike body to the soft cushions and leaned forward on the low table. He looked slowly and carefully around the room. Five pairs of eyes looked back at him.

"Yalkuus, you may as well begin. Keep your summary brief and to the point. Remember, this is only a preliminary hearing." Kluus's face darkened. "Although we probably already know what we will recommend to the Joint Chiefs. Yalkuus?"

Kiirnemar Yalkuus rose to his feet. "The twelve ships appeared at approximately 10:47 hours Lydion standard on Zeerog 6 of this year. There was no warning. They were just suddenly *there* on the radar screens, about thirty-five hundred larqes off the surface of Mera, slightly outside its orbit around Lydion; heading for Lydion at about five larqes per second. We tried to signal them from Mera base, of course." He snorted. "I almost ordered our standard recognition pattern beamed at them. Shows how well I was thinking. One of the technicians came up with something a little better,

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Kelly Freas

though. Pulses counting out the prime numbers. Not that it did any good.

"Anyway, we kept trying to raise them on every frequency we could manage, including optical laser. No response. They just stayed right on their original course—for about three minutes, that is. By then they were almost straight above Mera main base. They turned; at more than eighty gravities acceleration, if you want to believe our computers. Just changed course and dived at us."

Yalkuus's voice hardened. "That did it. They were diving on our main base on Mera in what looked like attack formation. I ordered the Questors fired. All twenty of 'A' battery.

"Those blasted ships acted as if they were laughing at us. They just broke formation and dodged. Dodged our Questors! Maximum acceleration over a hundred gravities and those ghosts outmaneuvered them! But don't get the idea that the Questors would have done that much good even with another fifty gravities acceleration. As soon as one of them got within even ten larqes of target it got blasted by some kind of countermissile. Nice hardware, those countermissiles," Yalkuus went on bitterly. "Half the

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size of our Questors, just as accurate, and warheads just as powerful. Oh, yes, and capable of boosting at well over *two* hundred gravities!"

Kluus looked at him wearily. "Are you through, or did you plan to resign your commission also?"

"Huh? Kiirnemar, if you'd been in command of that base—"

"All right!" Kluus went on more slowly, "If you don't mind, I believe we are more interested in what happened than in your thoughts on these aliens' sense of humor."

"Y-yes, sir," Yalkuus managed. "Well," he said, regaining some of his poise, "after 'A' battery had gone off there was nothing to do but throw everything else we had at them. With exactly the same results: No hits. By then those ships were scattered all over the sky. One of them was down to fifty larqes off the surface." He smiled grimly. "And one of our Questors nailed it. Got within half a larq and detonated."

He frowned again. "And that blasted boat just lost power. Any ship we've got would have been vaporized. This thing just stopped boosting. Luckily it was traveling at well over Mera's escape velocity and tangent to the surface when it lost power. It just headed into orbit around the sun.

"The rest of those ships stopped dodging and turned and ran. They were all boosting at well over a hundred gravities now; needless to say we couldn't touch them. As soon as they got about thirty-five hundred larqes off-satellite they disappeared. Vanished. Just dropped off the radar screens." Yalkuus shrugged. "All we could do was to send some of our ships after the one we crippled."

Kalar broke the silence. "Those ships appeared that suddenly? They weren't detected by Thura base? By anyone else?"

Yalkuus shook his head. "They were detected by Thura base—one and a half seconds after Mera picked them up. Which, considering where Mera and Thura were in their orbits, is just the time it took for a radar pulse to go from Thura to Mera and back again. Our other bases—nothing. Every other radar screen in the whole blasted solar system—nothing. As far as our instruments are concerned, until 10:47 and some odd seconds that day those blasted ships just *weren't.*"

"All right, thank you, Yalkuus," Kluus said. He turned to the being seated at his right. "Varak, what was left of that ship when you and Lich reached it? Especially the drive system."

"Quite a lot. The drive field seems pretty much like our Urlappen drive. Creates a unidirectional pseudogravitational field that accelerates every subnuclear particle within the ship at the same rate. Keeps the crew or anything else

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from feeling the acceleration; everything inside the field is in free fall. Power comes from a hydrogen fusion reactor; again, same as our ships." He got to his feet and began pacing clockwise around the table. "Only none of our boats is good for more than fifteen gravities acceleration. Unless you want to call the Questors boats. Anyway, they're rocket powered. Hardly the same as the Urlappen drive."

"No mystery about that ship's performance, though. That bus simply has a fiendishly high power-to-weight ratio. Had. Not that much left of it. But that fusion reactor came through in relatively good shape."

Varak reversed course, began pacing counterclockwise. "Interesting piece of hardware. You all know the basic problem with our Zaldon ring fusion reactor, don't you? No? Up to about twenty KZX you get more effective power the more hydrogen you feed in to react. That's twenty KZX produced in the reactor. You've got to divert seven KZX of that into the stabilizer field coils to contain the reaction. Net power output, thirteen KZX.

"Fine. Feed in a little more hydrogen. What happens? More power, certainly. Say twenty-five KZX. But now it takes *fourteen* KZX to keep the reaction stable. Net power output, eleven KZX. Not so good, is it? Crank up your reactor to thirty-three KZX and it takes all thirty-three KZX just to keep the whole mess from blowing up in your face. And above thirty-three KZX you'd better have an outside source of power feeding into your stabilizer field coils, or what you have is no longer a reactor, but a rapidly expanding cloud of ionized plasma. You just don't get more than thirteen KZX out of a standard Zaldon reactor.

"I know, we can get twice that using Morlunn stabilizer units as we do with our planet-based power plants. So take a Zaldon reactor with Morlunn stabilizing coils plus accompanying gadgetry; net power output, thirty KZX. Add a few things like missile launchers, instruments, radar, communications gear, computers, crews' quarters, and slap a pressure hull around it. And you've got a ship with all the armament of a *Xilon*-class cruiser, more than twice the power, and only four times the mass.

"But these—invaders? Visitors? Whatever you want to call them—have that beat. They've got a set of stabilizing coils at least as efficient as our Morlunn units, but still a little smaller than what we use in our regular Zaldon shipboard reactors. I'd estimate the reactor on that ship as good for close to forty KZX.

"That's half of that outrageous power-to-weight ratio. The other half is the mass of that ship—or lack of mass. That boat is almost as large as a *Xilon*-class job, but only a quarter as massive. The whole structure is ridiculously flimsy by

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our standards. The framework probably wasn't stressed for more than one and a half gravities; just enough to support its own weight on the ground with the drive shut down. And that hull! The outer plating is barely enough to contain one atmosphere pressure. The ship isn't even compartmentalized. Oh, it's divided into compartments, but none of the bulkheads will stand up to anything faintly resembling one atmosphere pressure differential. One good-size puncture anywhere on the outer hull would depressurize the whole ship."

"Rather an odd way to design a ship, isn't it?" Kluus asked. "And could you stop that pacing? You're wearing a path in the carpet."

"Huh? Sorry. Odd? What's odd about it? Nothing at all, with the drive field this boat had. I know, it sounds like building a pressure hull out of aluminum foil stuck together with glue. But somehow that barge took a very near miss with a fusion bomb and came through still recognizable as a ship.

"The drive field's the whole thing. It seems it wasn't only a drive field, it was also a combination energy screen and meteor bumper. The field produces some quasi-surface almost completely reflective to radiant energy. It must let some light or something through; this boat has to navigate somehow. But only some. Hit it with more than some—the field lets some through and reflects the rest. Touch off a fusion bomb a larq or two away. Any of our ships would be vaporized. But against this field—well, you're trying to burn through a mirror with a laser. The target just doesn't soak up enough energy to hurt it.

"And that field must have been proof against meteors somehow; don't ask me how. So we've only had three ships holed by meteors in the last ten years. Would you build a ship that would be completely disabled by one hit? Neither would our 'invaders,' I'll bet."

"All right," Kluus said. "The ship was indestructible. How was it destroyed?"

"The same way you burn through a mirror with a laser—use a powerful laser. That Questor detonated half a larq away. The drive field reflected almost all of the radiation. But not quite all. The field absorbed enough energy to cause an overload on the field generators. They couldn't take it. They burned out.

"And they did so in a very spectacular manner. They not only practically destroyed themselves, but they did the same to most of the other power machinery on board. Not to mention such miscellaneous damage as blowing the hull wide open and depressurizing the whole ship, or producing enough hard radiation to wreck all the solid state electronics gear. And *all* the electronics gear was solid state. Computers, communications gear—just so much junk.

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"Oh, and we found your countermissiles, Yalkuus. Or rather what was left of seventeen of them, plus two launchers. All very close to what used to be the drive-field generators. As to why one of them didn't take out that Questor . . . no ideas. That explosion did so much damage it's impossible to tell what kept them from firing. All we found out is that they're not rocket-powered. They're driven by a scaled-down version of the ship's drive."

Kluus sighed. His eyes turned toward Tul. "And what of the crew? I presume there were no survivors?"

"After that explosion and explosive decompression? Of course there weren't. Those bodies could have been dead before that Questor hit for all we could determine. Except that I consider a ship manned by corpses unlikely. But I imagine you're more interested in what we did find out about them than in what we didn't.

"Bipeds; body weight roughly half of ours; two arms; five-fingered hands; head quite like ours; brain case not as large. But among other things these creatures have one less pair of legs to worry about. All males; at least the forty-three bodies we found more or less intact. The bits and pieces in the near vicinity of the power machinery are anyone's guess. Except why would these creatures have all their females, if any, standing watch down in the power room at the same time? Their biochemistry, carbon based, of course. And they were oxygen breathers."

Tul examined the faces around him. "Correct, gentlemen. Either these 'visitors' came from Lydion itself or from somewhere outside our own solar system. And I doubt that they could have been hiding out on our home planet all this time without our knowing it, don't you? So they came from another solar system somehow." He smiled. "Perhaps Lich has some idea of how."

Lich's booming voice almost echoed from the heavily draped walls. "It's been obvious ever since those ships started their appearing and disappearing act. Ronan's theory of relativity notwithstanding, you *can* build a faster-than-light drive. Varak and I found it when we went through the ship; or what had better be it, because it's the only piece of equipment we can't identify as something else. And it doesn't seem too badly damaged; the unit itself, at least."

"And can you reconstruct this device?" Kluus asked.

"Quite possibly. No, don't get your hopes up," Lich went on. "So we can reconstruct it. Do you have any idea how much work we'll have to do before we can use it? We have to know how much power this thing needs and how it's supplied. We found a set of bus bars leading back to the fusion reactor—melted. Burned apart. We can't tell what's supposed to be hooked up to what.

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We have to know how to pick and choose our destination. That seems to have been controlled by the main computer—which, thanks to that explosion down in the power room, is now just a piece of junk."

"But surely you have at least *some* idea of how this device operates."

"It operates by moving itself and the ship around it from point A to point B in such a manner that the distance between point A and point B, divided by the elapsed time for the trip, is a number greater than the speed of light. And in spite of all the complimentary remarks Public Information Service may have made about the qualifications of our theoretical physicists in the service of our glorious People's Commonwealth of Lydion, that's *all* I'm saying until my crew and I get that thing back into some semblance of working order."

Kluus's voice was icy. "You seem unable to make an intelligent remark about the workings of this device, so you make do with a clever one. You call yourself a theoretical physicist! The Joint Chiefs, my friend, will want something more in your report than your attempted witticisms."

"If you're so anxious for miracles, go make an offering in the Grand Temple. Don't give me that Outraged look! Any complaint about my 'insubordination' will have to go through the Marshal of Scientific Research and Development, and for some odd reason he seems more concerned about how well I do my work than about how nice I am to kiirnemars."

Kluus took a deep breath. "I beg your pardon. Would you be so kind as to inform us of whatever observations regarding this device you might wish to hazard?"

"I'd be glad to. And don't worry; we've got some idea of what this gadget can do, even if we don't know how it does it. Those twelve ships were traveling at about five larqes per second when they first appeared—one twenty-thousandth of the speed of light. They were moving a lot faster when the eleven of them disappeared, but hardly close to the speed of light. So you don't have to get up to light-speed first before you activate this . . . hyperdrive. Comic book name, but we've got to call it something. Those ships appeared about thirty-five hundred larqes off the surface of Mera; they disappeared at the same distance. That means this doesn't work at less than a certain distance from a body of planetary, or near-planetary, mass. Why not, I haven't the foggiest. But, if they could have reactivated this hyperdrive when we started tossing Questors at them, why not do that instead of hanging around and getting shot at?"

"Why not?" Kalar said. "Why not a lot of things. Why not appear like that somewhere else in the so-

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lar system instead of right in our back yard? Why not take it a little slower approaching Mera base instead of practically asking us to open fire? Why not fire a few of those countermissiles at Mera base itself when the shooting started? Why not stay and fight when they could have mopped us up? And just what were we invaded by? A war fleet? A scientific expedition? A colonizing party?"

"With an all male crew?"

"So forget the colonizing party. But what in Lud's name are we up against? What do these things do now? Mark us down as a menace to health and sanitation? Go back for the police? The Marines? The exterminators? Or do they just decide to stay out of our solar system until we learn some manners? I don't know; none of this makes any sense. Anything we do will just be a shot in the dark."

"Does that mean we should do nothing?" Kluus asked.

"No, of course not. But let's face it. Whatever we do, we won't really know what we're doing." Kalar sighed. "What *are* we doing, anyway?"

"Have we any choice?" Kluus said. "We must consider these beings hostile. Whatever their intentions, their mere existence is a threat to our security. We must prepare for a full-scale attack, whether they plan one or not.

"It goes without saying that in a major campaign our present weapons would be useless. We must rearm as soon as possible with as many new warships as we can produce. By an extraordinary stroke of good fortune we have been given an enemy vessel; damaged, but, hopefully, reparable. We must be able to duplicate its performance at the least; to improve upon it as much as possible.

"We must learn the workings of the faster-than-light drive. We now know nothing other than that it works. We must learn how it works, why it works, and most important, how we may put it to use." Kluus glared at Lich. "I hope it proves an interesting task."

"There they are," Parker said, his eyes still on the main radar screen of the battle cruiser *Sirius*.

"How many?" Taylor asked.

"Four so far . . . no, five now."

"Chang. Anything from N'guri?"

"He's sending now, captain." Chang, the radioman, looked up, grinning. "'Mission Accomplished!'"

"Why can't that guy come up with something original? Tell him I'll be waiting for him down by the berths. How many now, Parker?"

"All eleven, sir. Last one only fifty kilometers out. They should all be in their berths in a few minutes. Not bad piloting."

"Not bad," Taylor agreed.

The crews were already filing out of the air locks when Taylor arrived on the berthing deck. He looked

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around, his eyes searching . . . there. "N'guri!"

"Hi, boss!" Weaving slightly, the tall figure strode toward Taylor. "Mission Accomplished!"

"You said that already. Are you drunk or something? You look like you're ready to fall over."

N'guri winced. "Two days of free fall in that tin can you mistakenly call a spaceship and this is the thanks I get. Two days, boss! I'm not used to it!"

"N'guri, you're a disgrace to the memory of Project Apollo. Come on, let's go up to my cabin. How did the drone handle? Any trouble switching it in or out of hyperdrive?"

"None. The drag field worked beautifully. The drone handled like another part of my own ship—which I guess it was. No trouble with any of the other equipment; that hyperdrive probably could have handled another drone. It still would have been nice if you could have tossed in a synthograv unit, though."

"Fusion reactor," Taylor began. "Normal space drive. Hyperdrive unit, big enough to handle your ship *and* the drone. Drag field, just to make sure the drone stays inside your ship's hyperdrive field. And besides all that junk you want us to fit a synthograv generator into a boat that size? Now what happened to the drone?"

"As planned. One of their missiles caught it about a hundred fifty kilometers off the surface of their inner moon. The drive-field generators blew, don't worry. Right now that thing's in orbit around their sun with some of their ships after it. They should catch up with it in another day or two." They reached Taylor's cabin. "Listen, boss, just how long do you think it'll take those polo ponies to figure out that that Kyrstron 'hyperdrive' is a dud?"

"Who knows?" Taylor said as they entered. "Maybe ten years, maybe fifty, maybe a hundred. How long did it take *us* to decide that that thing was a bad guess? Just wait until those characters try to make an analysis of the field that gadget produces—once they put it back together. Did you ever try disproving Kyrstron's equations?"

"What am I supposed to be, a weapons officer or a mathematical physicist? I never got past tensor calculus."

"They're a mess. To disprove them you've got to know Lorocco's transformation, which you learn by making an analysis of a Mark I, II, III, IV, V, or VI Hyperdrive Field Generator—or of one of the first working models thereof. Which, according to Kyrstron's equations, shouldn't work, even though it does, and which means that Kyrstron's unit just doesn't work, even though it should. Which means . . . never mind! Which means that after those polo ponies spend a few decades trying to get some action out of that 'hyperdrive' unit they'll be a little

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less pugnacious than they are now."

"Why did the Council decide to give them the treatment, anyway?" N'guri asked.

"Usual thing. Military government, in their case tied in with a state religion. 'The Grand Temple of Lud the Omnipotent, Holy Protector of the People's Commonwealth of Lydion.' We couldn't have translated that right; something that bad they'd never get away with. But haven't you seen some of our translations of their video broadcasts that our spyers picked up? Their good old Public Information Service can come up with stuff as bad as something out of the Twentieth Century."

N'guri didn't answer.

"Anything wrong?" Taylor asked.

"Huh? Sorry, boss." N'guri paused. "I was just thinking about Carson and the rest of them on board the drone. Somehow that just doesn't seem a proper way to give a man burial."

"I know; but . . . 'The dead don't care.' Your grandfather donated his body to a medical research lab, didn't he? Is this any different?"

"Well . . ." N'guri smiled. "No. Not really."

Taylor's smile answered N'guri's. "You knew Carson. Right now his ghost is off some place laughing to itself about the joke his deceased form helped to pull on some poor, unsuspecting centaurs." ■

In Times To Come

Next month's lead yarn is "Computer War," a two-part serial by Mack Reynolds. It's perfectly logical that a highly-integrated computer can work out the exact military potentials of two clashing nations, and determine precisely the most effective application of military strength. Clearly, such a computer can determine beforehand the duration, outcome, and cost of a war.

Perfectly logical.

Only human beings are not logical; they're rational, which goes a step further.

And a computer can be utterly and irremediably fouled up by a small dose of computer-type LSD. Think there is no such thing? Hah!

And computers being logical, don't consider such illogical actions as charging into the field of fire of a machine gun; it can prove mathematically that that's futile.

Because of its structural nature, it can't evaluate the concept of guts!

THE EDITOR

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SYNOPSIS

The movie producer, BARNEY HENDRICKSON, has a foolproof plan to save the ailing fortunes of Climactic Studios. He intends to make a wide-screen spectacular film about the discovery of North America by the Vikings—and will cut costs by traveling back in time to film it on the spot as it happens. To do this he uses the vremeatron, a time machine invented by PROFESSOR HEWETT. A preliminary trip is made to the Orkney Islands in 1003 A.D., and they return with OTTAR, ferocious Viking, a lawless and happy product of his time.

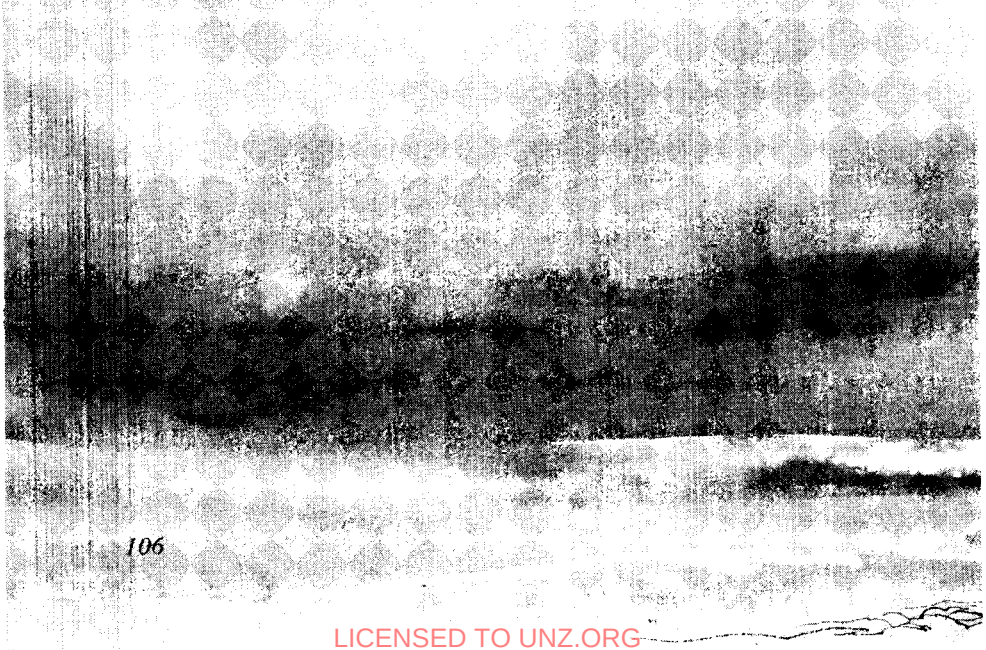
OTTAR—for the proper pay-

The Time-Machined Saga

Conclusion. It was long since said that
"Things aren't always what they seem"—and that was before
Hollywood went to work with a time machine
to make a great Saga of the Vikings.
Only—they didn't know they were really making it!

HARRY HARRISON

Illustrated by John Schoenherr



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ment agrees to help them, and he is returned to his own age along with the linguist, DR. JENS LYN, who will teach him English. Production plans are pushed ahead rapidly. CHARLEY CHANG is hired to write a script for the screenplay; RUF HAWK, a dim but well-muscled slab of beefcake, is engaged to play the male lead, while SLITHEY TOVE, sex-bomb extraordinary, will play opposite him. BARNEY plows steadily through all the difficulties that get in the way of production, and is forced to strand CHARLEY CHANG on prehistoric Catalina Island where he can write the script. Everything

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is rushed, since the entire film must be completed within a week, before the banks can write paid to the whole operation. Once BARNEY can get the company moved into the Eleventh Century it can be done—since no time will pass in the present while they are shooting the film.

The caravan of trucks and trailers moves into the past and the filming begins, though interrupted by small problems—and large ones such as a raid by marauding Vikings. But it still looks as though things will work out well, until RUF, the star of the picture, breaks his leg.

RUF is terrified by the Vikings and insists on returning to Hollywood and leaving the picture. BARNEY seeks solace in drink, and under its influence gives the Viking OTTAR a screen test for the lead role. OTTAR does far better than expected and gets the part. Shooting continues—though there are a number of trying moments. The first half of the picture is completed when a complication arises. PROFESSOR HEWETT has used the time machine to search the North American continent. No trace of Viking settlements can be found. Yet a settlement is needed in order to finish the picture on location. A ship is obtained and OTTAR agrees to sail it to Vinland and build houses for a set. He and his companions leave and BARNEY jumps ahead in time to meet him upon arrival.

Part 3

XIII

All the world was gray, silent, damp, pressing in on them. The fog muffled everything, soaking up sound, as well as sight, so that the ocean before them was an unseen presence until a low wave appeared, breaking silently into froth as it rushed up the slope of the sandy beach almost to their feet. The truck, no more than ten feet away, was only a dark shape in the mist.

"Give it another try," Barney said, squinting into the damp wall of blankness.

Dallas, protected from the weather by an immense black poncho and wide-brimmed Stetson, raised the carbon dioxide pressure flask with the foghorn attached, and opened the valve. The moaning blare of sound throbbed out across the water, still echoing in their ears after the valve was closed.

"Did you hear that?" Barney asked.

Dallas cocked his head and listened. "Nothing, just the waves."

"I swear I heard splashing, like someone rowing. Give it another blast, and keep it up, every minute, and listen closely in between."

The foghorn sounded again as Barney trudged up the slope to the canvas-shrouded Army truck and looked into the back. "Any change?" he asked.

Amory Blestead shook his head

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no without turning away from the radio receiver. He had earphones clamped to his head and was slowly turning the knob of the directional loop antenna on top of the set. It rotated in one direction, then in the other, and Amory looked up and tapped the pointer on the base of the loop.

"As far as I can tell the ship hasn't moved," he said. "The bearing is still the same. They're probably waiting for the fog to lift."

"How far away are they?"

"Barney, be reasonable. I've told you a hundred times I can tell direction, but not range, with this setup. I can't read anything from the signal strength of the responder, could be a mile, could be fifty. The volume has picked up since we first heard it three days ago, so they're nearer, but that's all I know. And I can't work out the distance from the bearings because there are too many variables. We've been cutting back and forth so I can't use the truck's speedometer to get a baseline, and the Viking ship must have moved . . ."

"You've convinced me. That's what you can't tell me—but what *can* you tell me?"

"The same as before. The ship sailed from Greenland eighteen days ago. I aligned the gyrocompass with the Strait of Belle Isle, put in new batteries and turned on the responder and tested it, and we watched them leave."

"You and Lyn told me the crossing would take only four days," Barney said, worrying a hangnail with his teeth.

"We said it *might* take only four days, but if the weather got bad, the winds changed or anything like that, it could take a lot longer. And it has. But we have picked up a signal from the responder which means they've made the crossing safely."

"That was two days ago—what have you done for me lately?"

"Speaking as an old friend, Barney, this time traveling is doing absolutely nothing for your nerves. We're supposed to be making a film, remember? All this other stuff we do is above and beyond the call of duty—not that anyone is complaining. But off with the pressure and make it easier on all of us, as well as yourself."

"You're right, you're right," Barney said, which was about as close as he could ever come to an apology. "But two days—the waiting gets to you after a while."

"There's really nothing to worry about. With this fog and no wind to speak of, lying off an unknown coast—they're not going to do any moving about. There's no point in rowing around if you don't know where you're going. Right now, according to the direction finder, we are as close to them as we can get on dry land and when the fog lifts we can guide them in . . ."

"Hey!" Dallas shouted from the

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beach, "I hear something, out there in the water."

Barney skittered and half slid down the slope to the beach. Dallas had his hand cupped to his ear, listening intently.

"Quiet," he said, "and see if you can hear it. Out there in the fog. I swear I heard water splashing, like rowing, and voices talking."

A wave broke and receded, and for a moment there was a hushed silence—and the slapping of oars could be plainly heard.

"You're right!" Barney shouted, then raised his voice even louder. "Over here—this way!"

Dallas shouted, too, the foghorn forgotten for the moment as a dark shape loomed out of the fog over the sea.

"It's the boat," Dallas said, "the one they had slung on deck."

They called and waved as a sudden rift opened in the mist, giving them a clear view of the craft and its occupants.

The boat was made of some kind of dark skins and the three men in it were wearing fur parkas with the hoods thrown back uncovering their long black hair.

"They're not Vikings," Tex said, waving his arm so that his black poncho flapped. "Who are they . . . ?"

When he did this the two men in the rear dug their round paddles into the water, but the man who was kneeling in the front whipped his arm forward and something flashed through the air towards Dallas.

"They got me!" Dallas shouted and fell over on his back with a spear sticking up out of his chest. The foghorn hit the beach next to him and the valve opened and sound blared, roaring out across the water. When it did the men in the boat reversed their paddling with vigor and within a few strokes had vanished again into the fog.

Only a few seconds had passed, from the time they appeared until the instant they vanished, and Barney stood, stunned by the impact, deafened by the wave of sound. It made thinking difficult and he had to stop it before he turned to Dallas who still lay unmoving on his back, looking as dead as a kipper.

"Pull this thing out, will you?" Dallas said in a calm voice.

"I'll hurt you . . . kill you . . . I can't . . ."

"It's not as bad as it looks. But make sure you pull up and don't push down."

Barney gingerly tugged on the wooden handle of the spear and it came up easily enough, but it caught in Dallas's clothing so that he finally had to brace his feet and pull hard with both hands. It came free and tore a great strip of rubberized cloth from the poncho. Dallas sat up and lifted the poncho and ripped open his jacket and shirt.

"Look at that," he said, pointing to a red scratch on his ribs. "Another couple of inches to the right

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and it would have ventilated me. That hook was digging into me when I moved and felt a lot worse than it looks now, let me tell you." He touched the sharp barb that projected from the ivory head of the spear.

"What happened?" Amory called out, running down the slope from the truck. "What's that? Wasn't there a boat?"

Dallas stood and tucked his shirt back in. "We have been contacted by the locals," he said. "Looks like the Indians, or the Eskimos, or somebody, got here before the Vikings."

"Are you hurt bad?"

"Not fatal. This spearhead didn't have my name on it." He chuckled and looked closely at the weapon. "Nice job of carving and good balance."

"I don't like this," Barney said, groping out a damp cigarette. "Didn't I have enough trouble as it was? I just hope they don't find the Viking ship."

"I hope they do," Dallas said with relish. "I don't think they would give Ottar much trouble."

"I wanted to tell you," Amory said, "that from up there in the truck you can see the fog breaking up, and the sun coming through in patches."

"And about time," Barney said, dragging deeply on the cigarette so that it fizzled and crackled.

Once the sun began burning away the mist it cleared quickly, helped by the west wind that blew steadily in their faces. Within a half an hour it had lifted completely and there, clearly visible about a mile offshore, was Ottar's *knorr*.

Barney almost smiled. "Give them a blast on that thing," he said. "Once they look this way they'll see the truck."

Dallas kept triggering the CO_2 cylinder until it finally squawked and died, and it had the desired effect. They could see the big sail narrow, then widen again as it was pushed around, and the white bone of foam appeared at the bow as the ship gathered way. There was no sign of the skin boat which seemed to have vanished as suddenly as it had appeared.

A few hundred yards offshore the *knorr* turned and hove to, sail flapping, rocking in the gentle swell. There was a great deal of arm waving and incomprehensible shouting. "Come on," Barney shouted. "Come ashore. Why don't you beach that thing?"

"They must have their reasons," Amory said. "The kind of shore here, or something."

"Well, how do they expect me to get out there?"

"Swim maybe," Dallas suggested.

"Bright boy. Maybe you ought to dogpaddle over and give them a message."

"Look," Amory pointed, "they've got a second boat aboard." The *knorr*'s own boat, a twenty-foot

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long miniature of the mother ship, was still visible on deck, but a smaller boat was being dropped over the side.

"Something familiar about that thing," Dallas said.

Barney squinted at it. "You're dead right. It looks just like the one the redskins had."

Two men climbed into the bobbing craft and began to row towards the shore. Ottar was in the bow, waving his paddle at them, and a few moments later he and his companions beached the skin boat and splashed ashore.

"Welcome to Vinland," Barney said. "How was the trip?"

"Coast here no good, no grass for the animals, trees no good," Ottar said. "Did you find a good place?"

"The best, down the coast a few miles, just what you asked for. Any trouble on the crossing from Greenland?"

"Wind the wrong way, very slow. Plenty of floating ice and seal and we saw two skraelling*. They were killing seals and tried to row away but we went after them, and when they threw spears we killed them. Ate their seals. Took their boat."

"I know what you mean, we just met some of their relatives."

"Where's this good place you found?"

"Right down the coast, around the headland and past the islands—you can't miss it. Here, take Amory back in the ship with you, he'll show you the place."

"Not me," Amory said, raising his hands and backing away. "I just look at boats and I get green. My stomach would turn inside out and I'd be dead three minutes after I left the shore."

With the regular soldier's innate capacity to avoid an unpleasant task, Dallas was already on his way up the slope when Barney turned towards him. "I'm a truck driver," Dallas said. "I'll be waiting in the cab."

"All employees, loyal and true," Barney said coldly. "I get the message, boys, don't repeat it. All right, Amory, tell the truck driver to get to the camp. We'll come in the ship as fast as we can and get Ottar's people ashore, and maybe some day soon we can start making a movie again. Wake up Gino and tell him to get up on the hill, that spot we picked out, and shoot the ship when it comes in. And make sure those tire tracks along the beach are smoothed over."

"Right, Barney, just as you say. I wish I could go in your place, but me and ships . . ."

"Yes, sure. Get going."

Barney got soaked getting into the boat, and the water was so cold it felt like his legs had been amputated below the knees. The boat, just seal skins stretched over a bentwood frame, was wobbly and skittered over the water like a great

*Barbarians. Specially used about the natives of Greenland and North America.

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bug and he had to squat in the bottom and hold onto the sides for support. When they reached the *knorr* he couldn't get out of the lurching craft and over the high side of the ship until strong hands reached down and hauled him up like a sack of grain.

"Hananu! Sidustu handartökin." * Ottar roared and his men shouted back happily as they ran to swing the ship about for the last leg of her voyage. Barney retreated to the aft deck so he wouldn't be trampled in the rush of activity. The seamen were shifting the *beitass* pole and the women screamed as they scattered out of the way, while the tethered sheep could only protest noisily when they were kicked aside. The crowded deck area resembled a seething farmyard with the torn open bundles of fodder and frightened livestock. In the middle of all the hubbub one of the women was bunkered over, milking a cow into a wooden bucket. When the ship turned the wind carried the odor of the bilges to Barney and the barnyard resemblance was even more apparent.

Once they were under way things settled down and even the animals returned quietly to their feed. The following wind not only filled the sail but it drove most of the odors ahead of the ship and the air on the rear deck was fresh and clear. The cutwater at the bow hissed through the long Atlantic swells, churning up a rounded, foaming bow wave that rushed along the sides of the ship. Riding light as a cork over the sea, the *knorr* was a graceful and practical vessel, at home in her true element.

"Land looks good," Ottar said, steering with a light touch on the tiller bar, as he pointed with his free hand towards the shore where large trees and patches of meadow were beginning to appear.

"Wait until you get around the point," Barney told him, "it's even better there."

They were passing the islands that stood outside the bay and the animals caught the scent of the fresh grass and set up a clamor. The bull, hobbled and tied, pulled at its rope and bellowed and the women were shouting with joy, while the men were singing. The voyage was coming to an end and the landfall was a good one. Even Barney felt the excitement as Epaves Bay opened up before them with the tall trees rising up the hills to the blueness of the skies, and the fresh spring green of the grass meadows by the stream. Then he picked out the dark spot of his cameraman and the jeep on the slope and he remembered the film. He knelt behind the bulwark and stayed low and out of sight as he pulled himself over to a horned Viking helmet that was tied by a thong to a hole in one of the timbers. Only when this was settled clammily on his head did he raise up enough to be seen from shore.

*"Come on! The last bit of work."

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Ottar was driving the ship at full speed towards the mouth of the stream and all aboard were shouting with excitement. The *knorr* scraped the sandy bottom, was lifted clear by a wave and carried forward, then touched bottom again and shuddered to a halt. Without bothering to lower sail the crew and passengers were leaping into the surf and wading ashore, laughing with joy, splashing through the stream and into the meadow beyond. Ottar tore up a great handful of the kneehigh grass, smelt it then chewed a bit of it. Some of the others were rolling on the ground, taking an animal pleasure in the solid earth after all the days aboard the ship.

"Great!" Barney shouted, "absolutely great. The landing in Vinland after months at sea, the first settlers in the new world. A great shot, a great historical shot." He made his way through the frenzied animals to the bow and stood up where he could be seen by the cameraman and waved his arm in a come-on motion. "That's enough of that," he shouted. "Get down here."

His voice couldn't carry but the gesture was unmistakable. Gino stood up from behind the camera and waved back, then began to load the camera into the jeep. A few minutes later it churned along the beach and Barney jumped down from the ship and ran to meet it.

"Hold it," he called to Dallas who was driving. "Swing around and get up on that bank there, directly opposite the stream. Gino, set the camera up on the top so we can get a head-on shot of the ship coming in, people running off, right into the camera, streaming by on both sides."

"Absolutely a tremendous picture," Gino said, "the way they came out of the ship. Give me ten minutes."

"You got it. It'll take longer than that to set the shot up again. Hold it," he ordered Dallas, who was starting to swing the jeep around. "I want your bottle."

"What bottle?" Dallas asked, with open and innocent eyes.

"The bottle you always got with you, come on. A loan, you'll get it back later."

The stunt man reluctantly produced a black-labeled, one-quarter empty bottle of whiskey from under the seat.

"Well, well," Barney said coldly. "Been getting into the private stock."

"I ran out, an accident, I'll pay it back."

"And I thought I had the only key to this stuff. The things the Army taught people. . . ! Get moving." He stuck the bottle inside his jacket and walked back to Ottar who was kneeling by the stream and snuffling up water from his cupped hands.

"Get them back aboard, will you?" Barney said. "We want to

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shoot the landing again, from much closer up."

Ottar looked up and blinked, wiping the water from his flowing beard with the back of his hand. "What you talk about, Barney? Everyone happy to be on land. They won't go back onto the ship."

"They will if you tell them to."

"Why should I tell them to? A nuts idea."

"You tell them to because you're back on the job. Here's some salary." He passed the bottle to Ottar who smiled broadly and raised it to his lips. Barney finished convincing him while he drank.

It wasn't easy to get them back aboard, even for Ottar. He finally lost his temper, something he did readily, stretched one man on the sand with a blow to the chest and kicked two of the women in the right direction. After this, though there was much grumbling and shouting complaint, they pulled themselves aboard and unshipped the oars. The effort of dragging the *knorr* free quieted the rest of the rebellion.

On shore, as soon as the camera was unloaded, Barney sent the jeep racing back to the camp. It had returned, before the ship had reversed in the bay and raised its sail again, with the rear seat filled with cases of beer, boxes of cheese, and canned hams.

"Dump it out," Barney ordered, "about ten yards beyond the camera, and build it up high so they can see it. Break out the hams so they will know what they are. Bring me a ham and a can of beer."

"Here they come," Gino said. "Tremendous, absolutely fantastic."

At full tilt the *knorr* raced across the bay, until the big squaresail loomed up above them, driving into the mouth of the stream with a great splashing of spray. Barney wasn't sure if the enthusiasm would carry through his second landing and he wasn't taking any chances.

"Ol!" he shouted at the top of his lungs. "Svinakjöt, öl ok ostr!"*

They got the message. After almost three weeks on a cold ration of hard bread and dried fish they roared with enthusiasm. The reaction this time was as good—or better—than the first arrival. They fought to get ashore, trampling each other into the shallows, and raced by the camera to get at the food and drink.

"Cut," Barney said, "but don't go away. As soon as they stoke up I want to get them unloading the wildstock." Ottar came up, a half-consumed ham in one fist and the bottle in the other. "Will this do for your camp?" Barney asked.

Ottar looked around and nodded happily. "Good grass, good water. Plenty of wood on the shore for burning. Plenty of trees with hard wood over there for cutting. Fish, hunt, this is a good place. Where's Gudrid? Where's everybody?"

*"Ale! Pork, ale and cheese!"

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"Taking a day off," Barney told him, "back on Old Catalina. A day off with pay, big party, barbecue, the works."

"Why party?"

"Because I'm generous and like to see people happy and we couldn't do anything until you arrived, and because it saves money. I've been waiting here for you with a skeleton staff for three weeks. Everyone else at the party will only be gone one day."

"Want to see Gudrid."

"Slithey you mean. And I imagine she wants to see you, too."

"Been a long time."

"You're a man of simple pleasures, Ottar. At least finish your ham first and remember that this is an historical moment. You have just arrived in the new world."

"You nuts, Barney. Same old world, just a place name of Vinland. Looks like good trees here."

"I'll remember those historical words," Barney said.

XIV

"I don't feel so good this morning," Slithey said, loosening the large gilt buckle on her belt. "It must be the air here, or the climate, or something."

"Something like that," Barney said with complete lack of sympathy. "The air. Of course it couldn't be that Viking barbecue on the beach last night with roasted clams and blue mussels over a driftwood fire and six cases of beer gone through."

She didn't answer him, but there was a deepening of the green tinge to her peaches-and-cream skin. He shook another two pills into the rattling handful he already had and held them out to her.

"Here, take these, and I'll get you a glass of water."

"So many," she said weakly. "I don't think I can get them down."

"You better, we have a day's shooting ahead of us. This is Dr. Hendrickson's guaranteed morning-after and hangover cure. Aspirin for the headache, Dramamine for the nausea, bicarbonate for the heartburn, Benzedrine for the depression and two glasses of water for the dehydration. It never fails."

While Slithey was choking over the pills Barney's secretary knocked on the trailer door and he shouted for her to come in.

"You look very bright-eyed this morning," he said.

"I'm allergic to mussels so I went to bed early." She held up the day's call sheet. "I've got a query for you." She ran her finger down the list. "Artists, O.K.; standins, O.K.; camera department, O.K.; props—they want to know if you want blood with the collapsible dagger?"

"Of course I do—we're not shooting this film for the kiddy matinee." He stood and pulled his jacket on. "Let's go, Slithey."

"I'll be with you in a moment," she said in a faint voice.

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"Ten minutes, no more, you're in the first scene."

It was a clear day and the sun had already cleared the ridge behind them and was casting long shadows from the sod huts and birch bark-roofed lean-tos in the meadow below. The Norse settlers were already busy and a thread of blue smoke rose straight up from the hole in the ridge of the largest building.

"I hope Ottar is in better shape than his leading lady," Barney said, squinting across the water of the bay. "Are those rocks there, just to the left of the island, Betty—or is it a boat?"

"I don't have my glasses with me."

"It could be the motorboat—see it's closer. And it's about time they decided to come back."

Betty had to run to keep up with his long strides down the slope towards the shore, skirting a huddle of cud-chewing cows. The boat was clearly visible now and they could hear the faint *pop-pop* of its motor across the water. Most of the company were waiting on the shore near the *knorr* and Gino was setting up the camera.

"Looks like the explorers are coming home," he called out to Barney, and pointed at the boat.

"I can see them and I can take care of it myself, so everyone else can stay on camera. We're going to shoot this scene as soon as I've talked to them."

Barney waited, almost at the water's edge as the boat came in. Tex was in the stern steering the outboard and Jens Lyn sat in front of him. Both men had good growths of beard and a decidedly scruffy look.

"Well?" Barney asked, even before the boat touched shore. "What news?"

Lyn shook his head with unconcealed Scandinavian gloom. "Nothing," he said, "anywhere along the coast. We went as far as we could with the gasoline we had, but found no one."

"Impossible. I saw those Indians with my own eyes—and Ottar killed a couple more. They have to be around somewhere."

Jens climbed ashore and stretched. "I would like to find them as much as you do, this is an unique opportunity for research. The construction of their boats and the carving of the spear leads me to suspect that they are members of the almost unknown Cape Dorset culture. We know comparatively nothing about these people, just some facts gleaned from digging on archeological sites, and a few hints from the sagas. As far as we can ascertain the last of them seem to have vanished about the end of this century, the Eleventh Century . . ."

"I'm not interested in your unique opportunity for research but in my unique opportunity to finish this picture. We need Indians in it—where are they?"

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"We did discover some camps on the shore, but they were deserted. The Cape Dorset are a migratory people, following the seal herds for the most part, and the schools of cod. I feel, that at this time of year, they may have moved farther north."

Tex heaved the motorboat's bow up on the beach, then sat down on it. "I don't want to tell the Doc here his business, but well . . ."

"Superstition!" Lyn snorted. Tex cleared his throat and spat into the water. This was obviously a difference of opinion they had had before.

"What is it? Out with it," Barney ordered.

Tex scratched the dark stubble on his jaw and spoke, not without a certain reluctance.

"Look, the Doc is right. We didn't see anything, or anybody except some old campsites and piles of seal bones. But, well, I think they're out there somewhere, close by, and they've been watching us all the time. It wouldn't be hard to do. You can hear this lawn mower engine five miles away. If they're seal hunters, like the Doc says, they could lay low when they heard us coming and we'd never see a thing. I think they're out there."

"Do you have any evidence to support this theory?" Barney asked.

Tex writhed unhappily and scowled. "I don't want to hear no laughing or anything," he said pugnaciously.

Barney remembered Tex's record as an instructor in unarmed combat. "One thing I'm never going to do, Tex, is laugh at you," he said sincerely.

"Well . . . it's like this. We used to feel it in the jungle, like someone was looking at you. Half the time someone was. Bang, a sniper. I know the feeling. And I've been getting it all the time we've been out. They're out there, somewhere close, so help me they are."

Barney considered the information, and cracked his knuckles. "Yes, I suppose you're right, but I don't see how it's going to help us. We'll talk about it during lunch, see if we can figure something out. We need those Indians."

Nothing went right with the scene, which was probably Barney's fault. His mind wasn't on it. It should have been simple enough to shoot since it was mostly action. Orlyg, played by Val de Carlo, is Thor's best friend and right-hand man, but he has secretly fallen in love with Gudrid, who is afraid to tell Thor because of the trouble it will cause. However, his passion becomes too great and, since Gudrid has told him she can love no other man while Thor is alive, he resolves in a moment of love-inflamed madness to slay Thor. He hides behind the ship and attacks Thor when he passes. Thor at first cannot believe it, however he does believe it when Orlyg stabs him in the arm. Then,

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with one arm only and barehanded, Thor goes on to win the battle and kill Orlyg.

"All right," Barney called out, his temper worn thin. "We're going to try it again and this time I'd be very much obliged if you could manage to get it right and remember your lines and everything, because we're running out of blood and clean shirts. Positions. Orlyg, behind the boat, Thor start down the beach towards him, camera, action."

Ottar stamped heavily through the sand and managed to look faintly surprised when de Carlo jumped out at him.

"Ho, Orlyg," he said woodenly. "What are you doing here, what does this mean . . . Mikli Odinn!* Look at that!"

"Cut!" Barney shouted. "That's not your line, you know better than that . . ." He shut up abruptly as he looked out into the bay where Ottar was pointing.

One after another small, dark boats were coming into sight from behind the island and soundlessly paddling towards the shore.

"Axir, sverd!" ** Ottar ordered, and looked around for a weapon.

"Hold it," Barney ordered. "No weapons and no fighting. We want to keep this friendly if we can, find something to trade with them. Those are potential extras out there and I don't want them frightened off. Tex, keep your gun handy—but out of sight. If they start any trouble you finish it . . ."

"A pleasure."

". . . But don't start any yourself, and that's an order. Gino, are you catching them?"

"In the bag. If you'll clear the Twentieth Century types off the set, I'll shoot the whole arrival, the landing, the works."

"You heard him, move. Off camera. Lyn—get into Viking rig quick so you can get down there and translate."

"How can I? Not a single word of their language is known."

"You'll pick it up. You're a translator—so translate. We need a white flag or something to show them we're friendly."

"We got a white shield here," one of the prop men said.

"That'll do, give it to Ottar."

The little boats slowed as they neared the beach, nine of them in all, with two or three men in each boat. They were wary, most of them gripped spears and short bows, but they did not look as though they were going to attack. Some of the Norse women came down to the beach to see what was happening and their presence seemed to reassure the men in the boats, because they came closer. Jens Lyn hurried up, lacing on his leather jacket.

"Talk to them," Barney said, "but stay behind Ottar so it looks like he's doing all the work."

*"Great Odin!"
**"Axes, swords!"

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The Cape Dorset group came close, rocking up and down in the swell, and there was a good deal of loud shouting back and forth.

"Using up a lot of film on this," Gino said.

"Keep it going, we can cut out what we don't need. Move along the shore for a better angle when they come in—if they come in. We got to find something to attract them, something to trade with them."

"Guns and firewater," de Carlo said. "That's what they always trade to the Indians in the westerns."

"No weapons! These jokers probably do well enough with what they got." He looked around for inspiration and saw a corner of the commissary trailer sticking out from behind Ottar's house, the largest of the sod buildings. "That's an idea," he said, and went over to it. Clyde Rawlston was leaning on it scribbling on a piece of paper.

"I thought you were doing additional dialogue with Charley?" Barney said.

"I find working on the script interferes with my poetry, so I went back to cooking."

"A dedicated artist. What do you have in this thing?"

"Coffee, tea, doughnuts, cheese sandwiches, the usual stuff."

"I don't see the redskins getting excited over that. Anything else?"

"Ice cream."

"That should do it. Dish it out into some of those Viking crockery pots and I'll send someone up for it. I'll bet those guys got a sweet tooth just like anyone else."

It did work. Slithey carried a gallon of vanilla down to the shore where some of the aborigines were standing in the surf by now, still too wary to come onto the beach, and ladled it into their hands after eating some herself. Either the ice cream, or Slithey's hormones, turned the trick because within a few minutes the skin boats were beached and the dark-haired strangers were mixing with the northmen. Barney stopped just outside of camera range and studied them.

"They look more like Eskimos than Indians," he said to himself. "But a few feathers and some war paint will fix that."

Though they had the flat faces and typical Asiatic features of the Eskimo, they were bigger men, erect and powerful looking, almost as tall as the Vikings. Their clothing was made of stitched sealskin, thrown open now in the heat of the spring day to show their bronze skin. They talked rapidly among themselves in high-pitched voices, and now that they had landed safely they seemed to have forgotten their earlier fear and examined all the novelties with great interest. The *knorr* fascinated them the most, it was obviously a sailing vessel, but infinitely bigger than anything they had seen, or imagined, before. Barney waved Jens Lyn over.

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"How are you coming? Will they do some work for us?"

"Are you mad? I think . . . I'm not sure mind you . . . that I have mastered two words of their language. *Unn-nah* appears to mean yes, and *henne* signifies no."

"Keep working. We'll need all these guys and more for the Indian attack scenes."

There seemed to be a general mixing along the shore now, as some of the northmen investigated the bundles in the boats and the Dorset opened them to display their sealskins. The more curious of the newcomers had wandered in among the houses, peering closely at everything and talking excitedly to each other with their piping voices. One of them, still clutching a stone-headed spear, noticed Gino behind the camera and went over and looked into the lens in the front, providing a detailed closeup. He turned around quickly when he heard a bellow, then shrill screams.

A cow had wandered across the boggy meadow that bordered the woods and the bull had followed her. Though small, the bull was a mean and surly beast with a cast in one eye that gave it an even more evil appearance. It was allowed to roam freely and had been chased from the movie encampment more than once. It shook its head and bellowed again.

"Ottar," Barney shouted. "Get that beast out of here before it upsets the Indians."

It hadn't upset the Cape Dorset—it had frightened them witless. They had never seen a roaring and snorting beast like this before and were rigid with fear. Ottar grabbed up a length of pole from the shore and ran, shouting, at the bull. It scraped at the ground with a hoof, lowered its head and charged Ottar. He stepped aside, called it a foul Old Norse name, then banged it across the flanks with the pole.

This did not have the desired effect. Instead of wheeling to get at its tormenter, the animal bellowed and charged towards the Cape Dorset, linking their dark and unfamiliar shapes with the present disturbance. The newcomers shrieked and ran.

The panic was catching and someone shouted that the *skraelling* were attacking and the northmen looked for their weapons. Two of the terrified Dorset were trapped in among the buildings and they ran to Ottar's house and tried to force their way in, but the door was bolted. Ottar rushed to defend his home and when one of the men turned, with his spear raised, Ottar brought the pole down on his head, cracking the pole in two and crushing the man's skull at the same time.

Within sixty seconds the scuffle was over. The bull, the cause of it all, had splashed through the brook and was calmly eating grass in the meadow on the other side. Driven by furiously wielded paddles the skin boats were heading towards the

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open sea, while many of the packs of sealskins had been left behind on the beach. One of the housecarls had an arrow through his hand. Two of the Cape Dorset, including the one Ottar had hit, were dead.

"Madonna mia," Gino said, straightening up from behind the camera and wiping his forehead on his sleeve. "What tempers these people have. Worse than Siciliani."

"It is nothing but a stupid waste,"

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Jens said. He was sitting on the ground holding his stomach with both hands. "They were all frightened, just like children, the emotions of children and the bodies of men. So they kill each other."

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"But it makes good film," Barney said. "And we're not here to interfere with the local customs. What happened to you—get kicked in the stomach during the stampede?"

"Not interfere with the local customs, very humorous. You disrupt these people's lives completely for your cinematic drivel, then you avoid the consequences of your actions . . ." He grimaced suddenly with his teeth clamped tightly together. Barney looked down and gaped at the spreading red patch between Lyn's fingers.

"You've been hurt," he said, unbelievingly, then spun about. "Tex—the first-aid box, quick!"

"Why the concern about me? I saw you looking at that housecarl with the wounded hand—and that did not seem to bother you. The Norse were reputed to sew up their wounds with carpenter's thread after a battle. Why don't you get me some thread?"

"Take it easy, Jens, you've been hurt. We'll take care of you."

Tex ran up with the first-aid box and put it on the ground next to Jens, kneeling at the wounded man's side.

"What happened?" he asked in a quiet, surprisingly gentle voice.

"It was a spear," Jens said. "So quickly, I never realized it. I was between the man and the boats. He panicked. I raised my hands, tried to talk to him, then there was just this stab of pain and he was past and gone."

"Let me look at it. I've seen plenty before, bayonet wounds in New Guinea." His voice was professional and calm, and when he pulled at Jens' hands they loosened and came away; with a quick slash of his knife he cut open the blood-stained clothing.

"Not bad," he said, eyeing the red wound. "Nice clean puncture into the guts. Below the stomach and it doesn't look deep enough to have got at anything else. Hospital case. They'll sew up the holes, put in some abdominal drains and fill you full of antibiotics. Try and treat it in the field and you'll be dead of peritonitis in a couple of days."

"You are being damn frank," Lyn said, but he smiled.

"Always," Tex said, taking out a morphine Syrette and cracking it open. "When a guy knows what's going on he don't complain about the treatment. Helps him, helps everyone else." He gave the injection with practiced swiftness.

"Are you sure the nurse cannot treat it here? I don't wish to return yet . . ."

"Full salary and bonus," Barney said cheeringly. "And a private room in the hospital—don't worry about a thing."

"It is not money I am concerned with, Mr. Hendrickson. Contrary to your beliefs there are other things in the world beside a buck. It is what I am learning here that counts. One page of my notes is worth more than every reel of your

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celluloid monstrosity put together."

Barney smiled, trying to change the subject. "They don't make film out of celluloid any more, Doc. Safety film, can't burn."

Tex shook sulfa powder onto the wound and applied a pressure bandage.

"You must ask the doctor to come here," Lyn said, anxiously. "Have his opinion about my leaving. Once I go the film will be finished and I will never return here, never."

Almost eagerly, as if to remember everything, he looked around at the bay and the houses and the people. Tex caught Barney's eye, gave a quick, negative shake of the head, and jerked his thumb towards the company camp. "I'm going for the truck, and I'll pass the word to the Prof to warm up the platform. Someone ought to bandage that Viking's hand, and give him a bottle of penicillin pills."

"Bring the nurse back with you," Barney said. "I'll stay here with Jens."

"Let me tell you what I have found out, just by chance," Jens said, laying his hand on Barney's arm. "I heard Ottar talking to one of his men about the compass repeater on the ship, and they pronounced it their own way, so that it sounded like usas-notra. It shocked me. There is a word in the Icelandic sagas, mentioned more than once, about a navigation instrument that has never been identified. It is called the *husasnotra*. Do you understand? It is possible that the word 'compass repeater' has entered the language as *husasnotra*. If so, then the impact of our arrival in the Eleventh Century is greater than any of us imagined. All the possibilities of this must be studied. I cannot return now."

"That's interesting, what you say, Jens." Barney looked towards the camp but the truck wasn't in sight yet. "You ought to write that up, a scientific paper, that sort of thing."

"Fool! You have no idea what I am talking about. For you the vremeatron exists only as a device to be prostituted to make a trashy film—"

"Don't be so free with the insults," Barney said, trying not to lose his temper with the wounded man. "No one was rushing to help Hewett until we gave him the money. If it hadn't been for this picture, you would still have your nose in the books at U.C.L.A. and wouldn't have a single one of the facts and figures that you think are so important. I don't run your job down—don't run down mine. I've heard this prostitution thing before, and it doesn't wash. Wars prostitute scientists, but all the big inventions seem to get made when there's a war to pay for them."

"Wars don't pay for basic research, and that is where the real developments are made."

"Begging your pardon, but wars

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keep the enemy and the bombs far enough away so that the basic researchers have the time and the freedom to do their research."

"A glib answer, but not a satisfactory one. No matter what you say, time travel is being used to produce a cheap picture, and any historical nuggets of truth will be found only by accident."

"Not quite right," Barney said, sighing inwardly as he finally heard the truck's engine. "We haven't interfered with your research, if anything we've helped it. You've had a pretty free hand. And in making this picture we have invested in the vremeatron so that it is now a working proposition. With the stuff you already have you should be able to talk any foundation into financing another time platform and letting you research to your heart's content."

"I'll do just that."

"But not for a while, yet." The truck braked to a stop nearby. "We have the professor tied up exclusively for a couple of years, just until we get our investment back, of course."

"Of course," Jens said bitterly, watching them unload a stretcher from the truck. "Profits first and culture be damned."

"That's the name of the game," Barney said, watching as the philologist was carefully slid into the truck. "You can't stop the world and get off, so you just have to learn to live on it."

XV

"Better to die like men than live like cowards," Ottar bellowed. "For Odin and Fria—follow me!" He held his shield before him as he threw the door open, and two arrows thudded into it. Shouting with rage he spun his ax and charged out of the burning building.

Slithey, waving a sword, followed him, as did Val de Carlo blowing loudly on the lurhorn; then all of the others.

"Cut. Print that!" Barney shouted and dropped down into his safari chair. "That winds it up, gang. Go get your lunch so they can pack up the kitchen."

The prop men were spraying foam onto the trough of burning oil and it stank abominably. All the lights except one went out and Gino had the camera open, taking out the film. Everything was under control. Barney waited until the rush was over, then went outside, too. Ottar was sitting on an upended barrel, folding the arrows back into his shield.

"Watch this, arrows coming," he called out to Barney and held up the shield. The springs whipped the concealed arrows into position with a *thunk-thunk*.

"A wonderful invention," Barney said. "We've finished the shooting for now, Ottar, so I'm going to move the company ahead to next spring. Do you think you'll have the palisade completed by then?"

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"Easy. You keep your bargain, Ottar keeps his. We can cut logs for wall easy with the steel saws and axes you leave. But you leave food for the winter so we can eat."

"I'll get the supplies first before we move the company. Is everything clear? Any questions?"

"Clear, clear." Ottar mumbled, concentrating on getting the arrows back inside the shield. Barney looked at him suspiciously.

"I'm sure you remember it all, but just for the record's sake let's run through it once more, quickly. We leave you the food, all the cereals and dried and canned stuff I can get from the studio commissary. That way you don't have to spend the summer and fall laying down food for the winter, so you can take the time to build some more shells of log buildings and a log wall around the camp. If what the Doc said is right, you shouldn't be bothered by the Cape Dorset until the spring when the pack ice closes in near the shore here and the seals band together and raise pups on it. That's when the hunters come, they'll all be farther north now. And even if they bother you before then you should be O.K. behind the log wall."

"Kill them, cut them up."

"Try not to, will you please? Ninety percent of this film has been shot and I'd feel better if you didn't get yourself slaughtered before we finished it. We'll check up on you in February and March, then bring the company as soon as we know the redskins are close by. Give them some trade goods to pay them to launch an attack on the stockade, burn part of it down and that is that. Agreed?"

"And Jack Daniels whiskey."

"That's in your contract . . ."

A brassy moan drowned his words, rising and falling unevenly.

"Must you?" Barney asked Val de Carlo who had the length of the lurhorn curled around his body, the nodulated flat plate of the opening over his shoulder, and was blowing on it.

"This is a wild horn," Val said, "listen." He licked his lips and applied them to the mouthpiece and, with much puffing and cheek reddening, produced a barely recognizable version of "The Music Goes Down and Round."

"Stick to acting," Barney said, "you have no future as a musician. You know, I keep thinking I've seen that kind of horn somewhere before, outside of a museum I mean."

"They've got it on every pack of Danish butter, it's a trademark."

"Maybe that's where. It sounds like a sick tuba."

"Spiderman Spinneke would love it."

"He might at that." Barney squinted as an idea hit him, then snapped his fingers. "That's what I was thinking about, the Spiderman. He plays all kinds of weirdo instruments in that beat joint, the Fungus

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Grotto. I heard him once, backed up with a brass section and a drum."

Val nodded. "I've been there. He's supposed to be the only jazz tuba player in captivity. It's the most terrible noise I ever heard."

"It's not that bad—and it might be just what we want. It gives me a thought."

Ottar thunked his arrows in and out and Barney leaning against the wall listened to the lurhorn until Dallas pulled up in the jeep.

"Ready to go," he reported. "All the commissary people are waiting and a couple of grips who volunteered because they wanted to see if Hollywood was still there."

"Enough to move the supplies?" Barney asked. "Everyone on the lot will have gone home by now."

"More than enough."

"Let's go."

One of the big trailer trucks had backed onto the platform and a dozen men were lounging around it. Professor Hewett had the door to the control cabin tied open and Barney looked in.

"Saturday afternoon, and cut it as close as you can."

"To the microsecond. We shall arrive precisely after the moment the platform left on the last trip."

It took an effort of will for Barney to realize that, despite all that happened during the previous months, it was still Saturday afternoon in Hollywood, the same day on which they had begun the operation. The weekend crowds were jamming up on the freeways, the supermarket parking lots were full, and at the top of Benedict Canyon Drive, behind his private golf course on the top floor of his mansion, L. M. Greenspan was suffering his phony heart attack. For a moment Barney considered telephoning him with a progress report, then decided not to. Only a few hours had passed for L.M. and he wouldn't be worrying yet. Best to let sleeping studio owner lie. Maybe he should ring up the hospital and see how Jens Lyn was doing, it had been weeks since —no it hadn't, just minutes here. He probably wasn't even at the hospital yet. Time travel took a lot of getting used to.

"It's a scorcher," one of the cooks said. "I shoulda brought my sunglasses."

The high sound-stage doors were rolled back, and when the time platform appeared all the men winced at the sudden onslaught of subtropical light. The northern Newfoundland sky was always a pale blue and the sun never burned down like this. Barney moved the men out of the way while the big diesel truck rumbled to life, then clanked down from the time platform. There was a holiday air about the occasion as they climbed into the truck and rolled through the empty streets.

At the commissary warehouse the holiday ended.

"I'm sorry, sir," the studio guard said, spinning his club on its thong.

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"But I've never seen you before, and even if I had I couldn't let you into this warehouse, no sir."

"This paper . . ."

"I've seen the paper, but I have my orders."

"Give me a war ax," one of the grips shouted. "I'll get that door open!"

"*Kill! Kill!*" another called out. They had been too long in the Eleventh Century and had picked up some of the Vikings' simple solution to most problems.

"Don't come any closer!" the guard ordered, stepping away and dropping his hand towards his gun.

"All right you jokers, enough of that," Barney ordered. "Just sit quiet while I straighten this out. Where's your phone?" he asked the guard.

Barney took a chance that someone might be there and called the Administration Building first. He hit pay dirt. Sam, L.M.'s personal accountant was there, undoubtedly cooking the books in private.

"Sam," he said, "it's good to talk to you again, how've you been . . . what? . . . sorry, I forgot. It's just been a couple of hours for you, natch, but it's been months for me. No, of course I haven't been drinking, I've been shooting the film. That's right, it's almost complete . . . Sam, no . . . don't get excited . . . This is no more a one-day picture than the script was a one-hour script. We've been working hard. Look, I'll explain it all later, but right now I want you to help me. I want you to talk to one of the studio guards, a real thick-headed job, must be a new man. Tell him to unlock the commissary warehouse so we can clean out all the dry cereals and canned stuff. No, we are not getting very hungry already, this is trade goods for the natives. Pay for the extras . . . Sam, what do you mean you have to think about it . . . if we can pay them off in Quaker Oats instead of greenbacks what possible difference can it make?"

It wasn't easy, it never was with Sam, but he was finally convinced. He took his temper out on the guard—Sam hated to spend money even if it was only Quaker Oats—who emerged from the phone booth red-faced and angry.

By 5:30 the truck was loaded, and by a quarter to six it was back aboard the time platform. Barney checked to make sure that everyone was aboard, then poked his head into Hewett's control cubby.

"Take it away, Prof, but let me get clear first."

"Am I to understand that you are not returning with us?"

"Correct. I have a bit of business here. You can unload these people and the supplies then come back to pick me up in a couple of hours, say about ten o'clock. If I'm not here I'll ring you on the warehouse phone over there and let you know what's happening."

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Hewett was feeling waspish. "I seem to be running a species of temporal taxi, and I am not quite certain that I enjoy it. My understanding was that we would go to the Eleventh Century to make your film, then return. Instead I seem to be operating a constant shuttle service . . ."

"Relax, Prof, we're coming down the home stretch. Do you think I would lose a couple of hours like this if I wasn't sure of the production? We do one more time jump, finish the picture up and that is that. All over but the shouting."

Barney stood by the door and watched the platform vanish into the past. Back to the wilds of primitive Canada, chapped lips and cold rain. Let them. He was going to take a couple of hours off, get some business done at the same time, of course, but that wasn't going to stop him from enjoying himself as well. He couldn't really relax yet, not until the film was in the can, but the end was in sight and he had been driving himself for months. The first order of business was going to be a first-class, deluxe dinner at Chasen's, that much at least he owed himself. There was no point in getting to the Fungus Grotto before nine o'clock at the very earliest.

There was an unreality about being back in California, and in the Twentieth Century. Things seemed to move too fast, there were too many garish colors and the stink of exhaust fumes made his head ache. Rube! Dinner—with drinks before, brandy after and champagne in the middle—helped, and he was feeling no pain when the cab dropped him in front of the club at a little after nine. He even managed not to be offended by the bilious green doorway with the red skulls and crossbones on it.

"Beware," a sepulchral voice moaned when he pushed open the door. "Beware that all who enter the Fungus Grotto do so at their own risk. Beware . . ." The recorded voice cut off as he closed the door and felt his way down the ill lit and black velvet lined stairwell. A curtain of glowing plastic bones was the last barrier before the inner sanctum of the club itself. He had been here before, so the novelty of the decor did not impress him. It had not impressed him the first time either, being just a cut above—or below—the ghost house at a carnival. Green lights flickered, rubber cobwebs hung in the corners, and the chairs were shaped like giant toadstools. He had the room to himself.

"A Bloody Mary," he told the vampire-garbed waiter. "Is the Spiderman here yet?"

"I fink he's in 'a dressing room," the creature mumbled around its plastic fangs.

"Tell him I want to see him, Barney Hendrickson of Climactic."

Spiderman Spinneke arrived be-

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fore the drink, a lean, black-garbed, scuttling figure with large dark glasses. "Long time no see, man," he said, letting his dank fingers flap against Barney's palm. "How'z the pix biz?" He sank into a chair.

"Keeping body and soul together. Tell me, Spider, is it true you scored a couple of films?"

"It is true I did the music for a ragged piece of class X film name of 'Teenage Beatniks' Hophead Rumble,' but I keep hoping people will forget about it. Why you ask? Can't be you're interested in the poor old Spiderman?"

"Might be, Spinneke, just might be. Do you think you could write the music for a picture and record it with your own group?"

"Anything's possible, Dad. But that takes time, we got commitments."

"Don't worry about the time, I'll fix it so you won't miss a single show. I thought you might have the right sound for a picture I'm doing, a stirring story of the Vikings. You've heard of them?"

"Cert. Hairy cats with axes, go around chopping people."

"That's roughly it. Primitive stuff, strong. They have a kind of brass horn and that gave me the idea. An all-brass score with drums, hammering away with primitive savagery."

"Real cool."

"Think you can handle it?"

"A natural."

"Good. Here's a C as a down payment." Barney took five twenties from his billfold and dropped them onto the table. Spiderman's fingers oozed across the black cloth and absorbed them. "Let's grab your boys and go around to the studio now and I'll give you the scoop. You'll be back here inside an hour." Where else they would be during that hour of Twentieth Century time Barney did not say.

"No can do. Doody and I just fake up until the rest come in around eleven. After that we're on until three. We can't split before then."

The Bloody Mary slid down smoothly. Barney looked at his watch and quickly convinced himself there was no point in going away and coming back again. Three a.m. Sunday morning would still be O.K. because they had until Monday to turn the film in. It was all going to work out. Spiderman slid back into the recesses of the club, and at ten Barney got on the phone and talked to Professor Hewett and arranged a new appointment for three, then went back to his table and relaxed, as much as he could relax with the hot tuba, brass section and amplified drums. The Bloody Marys helped.

At two o'clock he stirred himself and went out for a breath of air that wasn't solid with cigarette smoke and vibrating with wailing rhythms. He even managed to arrange for two cabs to come to the club just after three. Things were

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working out well, very well indeed.

It was close to four before they pulled up in front of the warehouse, and Professor Hewett was pacing up and down staring at his watch. "Very precise," he snapped.

"Not too bad, Prof old boy," Barney said, slapping him on the back, then turning to help pull the bass drum out of the cab. Then, in single file, they marched into the warehouse with Doody on the trombone playing "Colonel Bogey."

"What's the raft?" Spiderman asked, looking about bleary-eyed and tired.

"Transportation. Just climb aboard. We'll just be gone a few minutes from here, that I promise." Barney smiled slyly behind his hand as he said it.

"Enough already," Spiderman said, pulling the trombone away from Doody's fluttering lips. Doody kept playing for at least five seconds before he realized he wasn't making a sound. "Flying on pot," Spiderman explained.

Hewett snorted as the funereally robed musicians climbed aboard the time platform, then went into the control cubicle to start the vremeatron.

"Is this the waiting room?" Doody asked, following him into the cramped quarters.

"Get out you oaf!" the professor snapped, and Doody mumbled something and tried to oblige. But as he turned the slide extended from his trombone and swiped along the top of a row of exposed electronic tubes. Two of them popped and fizzled sparkily.

"*Yow!*" Doody said, and dropped the instrument. Its brass length fell across the exposed innards of the tubes and sparks jumped as the circuits shouted. All of the lights on the controls went out.

Barney was completely sober in less than a second. He pulled the musician out of the instrument room and herded him, and all the others, to the far end of the platform.

"How is it, Professor," he asked softly when he came back, but there was no answer. He didn't ask again but only looked on as Hewett tore off inspection hatches and hurled the broken tubes out of the door.

He sent the musicians away after he received a grudging *yes* in answer to his question, when he asked if it would be at least a couple of hours before the vremeatron would be fixed.

By nine o'clock Sunday morning Professor Hewett admitted that the repairs would probably take most of the day, not including the time needed to find replacement tubes on a Sunday in Los Angeles. Barney, hollowly, said that, after all, they had plenty of time. After all the picture wasn't due until the following morning.

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Late Sunday night Barney fell asleep for the first time, but he woke up with a start after only a few minutes and could not get back to sleep again.

At five a.m. on Monday morning the professor announced that the rewiring was complete and that he was going to sleep for an hour. After that he would leave and try to obtain the missing tubes.

At nine a.m. Barney phoned and discovered that the representatives of the bank had arrived and were waiting for him. He gurgled and hung up

At nine-thirty the phone rang and when he picked it up the girl on the switchboard told him that the entire studio was being turned upside-down trying to locate him, and that L.M. himself had personally talked to her and asked her if she knew where Mr. Hendrickson was. Barney hung up on her, too.

At ten-thirty he knew it was hopeless. Hewett had not returned, nor had he phoned. And even if he arrived at that moment it was too late. The picture could not possibly be finished in time.

It was all over. He had tried, and he had failed. Walking over to L.M.'s office was like trodding the last mile—which it really was.

He hesitated outside L.M.'s door, considered suicide as an alternative, decided he did not have the guts, then pushed the door open.

XVI

"Don't go in there," a voice said, and a hand reached past Barney and pulled his away from the door which sighed shut automatically in his face.

"What do you think you're doing?" he shouted, anger bubbling over, spinning about to face the other man.

"Just preventing you from making a mistake, Stupid," the other said, and grinned widely as Barney stumbled backwards with his jaw dropping and his eyes opening wide.

"A very nice take," the man said. "Maybe you should be acting in films, not directing them."

"You're . . . me . . ." Barney said weakly, looking at himself wearing his best pair of whipcord slacks, his horsehide Air Force pilot's jacket and carrying a can of film under his arm.

"Very observant," the other Barney said, smiling wickedly. "Hold this a sec." He held out the can to Barney, then dug into his hip pocket to get out his wallet.

"What . . . ?" Barney said. "What . . . ?" looking at the label on the can which read: "Viking Columbus"—Reel 1.

The other Barney took a folded scrap of paper out of his wallet and held it out to Barney—who noticed for the first time that his right hand

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was covered with a bulky, reddened bandage.

"What happened to my hand . . . your hand?" Barney asked, gazing in horror at the bandage while the can was snatched away from him and the piece of paper was thrust into his palm.

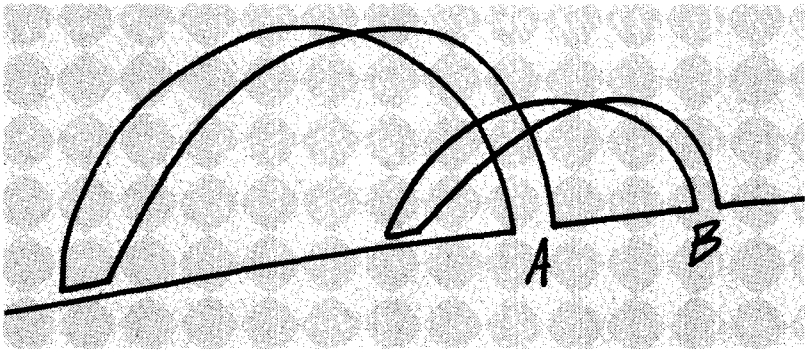
"Give that to the Prof," the duplicate Barney said, "and stop horsing around and finish the picture, will you?" He held L.M.'s office door open as a page came down the hall pushing a handcart loaded with a dozen cans of film. The page glanced back and forth at the two men, shrugged, and went in. The other Barney followed him and the door swung shut.

"The hand, what happened to the hand . . .?" Barney said weakly to the closed door. He started to push it open, then shuddered and changed his mind. The scrap of paper caught his attention and he unfolded it. It was part of a sheet of ordinary writing paper, torn along one edge and blank on one side. There was no writing on the other side either, just a sketch that had been drawn quickly with a ballpoint pen.

It meant nothing to Barney. He folded it and put it away in his wallet—and with a sudden jar he remembered the cans of film.

"I've finished the picture!" he cried aloud. "It's done and I've just delivered it on time." Two passing secretaries turned their heads and giggled at him; he scowled back at them and walked away.

What had the other Barney said to him? Stop horsing around and finish the film. Would he finish it? It looked like he would—if there had been anything in the cans. But how could he finish it now, after the deadline, and still turn it in on time?



"I don't understand," he mumbled to himself as he walked across the lot to sound stage B.

Even the sight of the professor working on the vremeatron did not disturb his whirling thoughts. He stood on the time platform and

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tried to understand what had happened, or what was going to happen, but fatigue combined with the shock of talking to himself had temporarily disconnected his reasoning powers.

"The repairs are finished," Professor Hewett said, wiping his hands on a rag. "We can return now to the year 1005."

"Take it away," Barney said, and reached for his wallet.

Even though it was a sunny day in Newfoundland it appeared dull after the Californian sunlight, and the air was certainly a good deal cooler.

"What time did we leave the studio just now?" Barney asked.

"1203 hours on Monday. And no complaints, if you please, that was very fast work I did on the repairs when you consider the damage done by the microcephalic musical oaf."

"No complaints, Prof. I'm beginning to think we still stand a chance to get this picture in by the deadline. I met myself in the building, and I saw myself delivering cans of film labeled 'Viking Columbus'."

"Impossible!"

"Very easy to say, but maybe you have as big a shock coming as I had. I told me, or he told me, or however the hell you say it, to give this to you. Can you figure it out?"

The professor took one glance at the paper and smiled broadly. "Of course," he said. "How stupid of me. The facts were obvious, right under my nose all the time, so to speak, and I never saw them. How simple the problem is."

"Could you bring yourself to explain it to me?" Barney said impatiently.

"The diagram represents two voyages through time, and the smaller arc on the right is the one that is of interest because it explains where the other 'you' came from with the cans of film. Yes, it is possible to still complete the film and deliver it before the specified deadline."

"How?" Barney asked, squinting at the diagram which conveyed exactly nothing to him.

"You will now complete the picture, and it is of no importance how much time you consume after the deadline. When the picture is complete you will be at point B on this diagram. Point A is the time the film is due, and you simply return to a time before A, deliver the picture, then return to B. How magnificently simple."

Barney clutched the paper. "Let me get this straight. Are you telling me that I can make the film *after* the deadline, then return to a time before the deadline to deliver the film?"

"I am."

"It sounds nuts."

"Intelligence resembles insanity only to the stupid."

"I'll forget that remark—if you can answer me one thing. This piece of paper with the diagram"—he

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shook it under the professor's nose —"who drew it?"

"I'm sure I do not know, having just seen it for the first time."

"Then think. I was handed this paper on Monday morning in front of L.M.'s office. I show it to you now. Then I'm going to put it in my wallet and carry it around until the picture is finished. Then I'll travel back in time to deliver the picture to L.M. I meet the old me in front of the office, take the diagram out of my wallet and hand it over to myself to be put back into the wallet and so forth. Now does that make sense to you?"

"Yes. I see nothing to get disturbed about."

"You don't? If that is the way it is going to happen, then no one ever *drew* this diagram. It just travels around in this wallet and I hand it to myself. Explain that one," he added triumphantly.

"There is no need to, it explains itself. The piece of paper consists of a self-sufficient loop in time. No one ever drew it. It exists because it is, which is adequate explanation. If you wish to understand it, I will give you an example. You know that all pieces of paper have two sides—but if you give one end of a strip of paper a one hundred eighty degree twist then join the ends together, the paper becomes a Mobius strip that only has one side. It exists. Saying it doesn't cannot alter the fact. The same thing is true of your diagram, it exists."

"But . . . where did it come from?"

"If you must have a source, you may say that it came from the same place that the missing side of the Mobius strip has gone to."

Barney's thoughts tied themselves into a tight knot and the ends flapped loosely. He stared at the diagram until his eyes hurt. Someone *had* to have drawn it. And every piece of paper *had* to have two sides . . . With slightly palsied fingers he put the diagram into his wallet, slid the wallet into his pocket and hoped that he would be able to forget about it.

"Ready for the time jump whenever you give the word," Dallas said.

"What time jump?" Barney asked, blinking at the stuntman who was standing before him.

"The jump to next spring, 1006, that we were talking about half an hour ago. The food has been turned over to Ottar, and the company is all loaded up and ready to go when you say the word." He pointed to the waiting rows of trucks and trailers.

"To next spring, yes, you're right. Do you know what a paradox is, Dallas?"

"The Spanish barber who shaves every guy in town who doesn't shave himself—so who shaves the barber?"

"That's the idea—only worse." Then Barney suddenly remembered

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the bandaged hand and he held up his right hand and examined it carefully on both sides. "What happened to my hand?"

"It looks great to me," Dallas said. "You want a drink?"

"It wouldn't help. I just met myself with a bloody, bandaged hand and I wouldn't even tell myself how it happened, or how bad it was. Do you realize what that means?"

"Yeah. You need maybe two drinks."

"No matter what you and your iron-age buddies think, alcohol is not the answer to all problems. It means that I am something unique in the universe. I am a sadomasochist. Everyone else, poor slobs, is limited to being masochistic to themselves, or sadistic to others. But I can get a masochistic kick by being sadistic to myself. No other neurotic can make this statement." He shivered. "I think I can use that drink."

"I got it right here."

The drink turned out to be a bargain brand of cheap rye that tasted like formic acid, and it etched such a burning track down Barney's throat that it did take his mind off the paradoxes of time and his own sado-compensatory inclinations. "Go take a look, will you Dallas?" he said. "Jump forward to March and find out if any Indians have been sighted yet. If Ottar says no, keep moving forward, a week at a time, until they have been seen, then report back."

Barney stood clear while the time platform flickered and settled down a few feet from its original position. Dallas climbed down from it and walked over, rasping his palm across his black growth of beard.

"The Prof figures we were away about ten hours in all," Dallas said. "That means overtime after —"

"Save it! What did you find out?"

"They got a wall put up, all logs like one of those forts in an Indian movie. Everything's quiet in the beginning of March, but on the last stop, the 21st, they spotted a couple of those skin boats."

"Good enough. Let's move. Tell the Prof to start shuttling the whole company through to March 22nd. Is everything and everybody here?"

"Betty checked the invoices and she says O.K. to that part. Me and Tex called the roll and everyone's present and accounted for and in the trailers, except for the drivers that is."

"How's the March weather?"

"Sunny, but with a nip in the air."

"Pass the word about that, to dress warmly. I don't want the whole company down with colds."

Barney walked back to his trailer and found his overcoat and gloves. By the time he returned to the head of the convoy the shuttle was in operation. He rode through into the spring of the year 1006, and a good northern spring it was, too. Watery sunshine did not do much to take the chill out of the air, and there

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was snow in the hollows and against the north side of the log palisade in the valley below. It did look like a western movie fort. Barney signaled to the driver of the pickup that had just arrived on the time platform.

"Take me down there, will you?" he said.

"Next stop Fort Apache," the driver told him.

Some of the northmen were beginning to straggle up the hill towards the arriving movie company, and the pickup drove past them and pulled up before a narrow opening where a loose log had been pulled aside to make an entrance into the stockade. Ottar was squeezing out through it when they arrived.

"We're going to have to cut a gate here," Barney told him. "A big double gate with a sliding bar inside to lock it."

"No good, too big, too easy to break through. This is the way to do it."

"You haven't been going to the right films . . ."

Barney's voice ran down into silence as Slithey squeezed through the opening behind Ottar. She was wearing a none-too-clean dress with a caribou-skin robe pinned over her shoulders. She didn't have on any makeup and she was carrying a baby on her hip.

"What are you doing here?" he asked querulously, feeling very put upon, that he had had more than enough shocks for one day.

"I've been here a while," she said, and put her finger into the baby's mouth and he sucked on it loudly.

"Look, we just came, what's with the kid?"

"It's funny, really," she said, and giggled to prove it. "After we were ready to go last summer, it was so lonely waiting in the trailer that I went out for a walk, fresh air, you know."

"I don't know, and I have a feeling I don't want to. Are you telling me that you spent the whole time here instead of making the jump with the rest of us?"

"That's just what happened, I was so surprised. I went for this walk and I met Ottar, and one thing led to another, you know . . ."

"This time I do know."

"And before I realized it everyone was gone. I was frightened. I tell you, I must have cried for weeks and weeks, and going accidental like I didn't take my Pills with me."

"That's yours then?" Barney said, pointing.

"Yes, isn't he sweet? We don't even have a name for him yet, but I call him Snorey, just like the dwarf in 'Snow White,' because when he's asleep he snores all the time."

"There was no dwarf named Snorey," Barney said, and thought fast. "Look, Slithey, we can't go back and undo this now, not with the baby and everything, and it was your fault you left the trailer."

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"Oh, I'm not blaming anyone," she said. "Once I got used to it it wasn't so bad, and Ottar kept telling me you would be here in the spring, and he was right. Only thing, I could use a real square meal, the way these people eat, gosh! I think I spent most of the winter on nothing but whiskey and Wheaties."

"We'll have a big party tonight, for you and Ottar—and the baby. Steak and wine, the works."

Snorey began to howl.

"I'll get Charley Chang working," Barney said. "We'll write the kid into the script. This picture is going to be full of surprises."

This brought back a painful memory and he looked down at his right hand and wondered *how* and *when*, then jammed it deep into the safety of his pocket.

XVII

The stone-headed spear had gone right through the side of the motorboat and was stuck into the flooring.

"I left it there to plug the hole," Tex said. "A few more came close but we were already leaving."

"They must have been surprised, or something," Barney said. "Maybe the sound of the motor frightened them."

"We were paddling."

"There had to have been a reason. The Cape Dorset are a peaceful people, you saw the way they behaved when they came here."

"Maybe they didn't like the idea of their relatives being chopped down when they acted friendly the first time," Dallas broke in. "We didn't go looking for trouble now, they gave it free without asking. If the motor hadn't started first pull, we would have had a burial at sea, or gone into their cooking pot, or something. Tex and I talked it over on the way back, and we figured that we should get combat pay for this mission . . ."

"Make a note of it on your voucher, I'll see what can be done —but just don't bug me about it now." Barney pulled on the spear, but it wouldn't come free. "I've got a few more important things to worry about. This picture is just about finished, except for the absolutely vital and very important Indian battle. We have to have it, and it is going to be a little difficult to have an Indian battle without Indians. There are a couple of thousand of them offshore there on the ice, and I send you out with the wampum and the beads to hire a couple and what do I get? Excuses."

The stuntmen were unimpressed by this argument and Dallas pointed coldly to the spear. A brassy wail split the air.

"Do they have to do that here?" Barney snapped.

"As I remember, it was your order," Tex told him. "The only place they wouldn't bother people with their playing was on the beach."

The black-robed procession filed down onto the shore with the drum-

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mer beating time and Spiderman leading the way. They carried folding chairs, as well as their instruments, and were wrapped in an exotic collection of scarves, deer skins and caribou robes.

"Pull the boat up on the beach and let's get out of here," Barney said.

"I second that," Dallas grunted. "These rehearsals are murder."

Spiderman tottered across the sand towards them, clutching his tuba to his chest, his red nose standing out starkly against the pallor of his skin.

"We gotta get a rehearsal hall, Barney," he pleaded. "All this fresh air will kill us for cert. Some of these cats haven't been outdoors in years."

"It'll clean their lungs out."

"They like 'em dirty."

"I'll see what I can arrange . . ."

"Enemy in sight!" Tex shouted. "Look at that task force."

It was an astonishing sight. From behind the islands that stood in the mouth of the bay came boatload after boatload of Cape Dorset, more and more until the water was dark with them. As they came closer a flickering could be seen in the air above each boat and a deep humming filled the air.

"This ain't no social call," Tex said.

"They might be friendly," Barney said with very little enthusiasm.

"How much you wanta bet?" Dallas said scornfully.

"All right, so we take . . . what do you call it . . . a defensive position. What do you suggest?"

Tex pointed his thumb at Dallas and said, "He has the seniority, so he issues the orders."

"Right then," Dallas snapped. "We get the civilians off the beach, we pass the word to Ottar to lock up his fort, we pull back to the camp. We form the vehicles into a circle with the house trailers inside, and pass out weapons to all the guys who have seen service. Then we sit tight. Tex, start the civilians back to the camp."

"It sounds all right," Barney agreed. "But aren't you forgetting that we still have a movie to make? I want Gino and his camera on the hill there, overlooking the whole thing. And I should have another camera, hand held maybe, inside the stockade to film them when they come up." He ran through the possible second cameramen and arrived at the inevitable, though depressing, conclusion that he was the only qualified one available. "I guess I'll have to go in with Ottar and his crowd."

"If that's the way you want it," Dallas said, and watched thoughtfully for a moment while the musicians fled back the way they had come. "Gino and his camera go in the back of the truck. The truck will be on the hill and it will have a driver. Since the truck is between the beach and the camp, Tex can ride shotgun on it—and he's in

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charge. When he says pull back, they pull back. I'll come with you into the stockade."

"Good, it sounds good, let's go."

The forward movement of the boats slowed as more and more of them appeared, as though they were massing for an attack. Whatever the reason, it gave the people on shore time to set up their defenses. Once the movie people were organized to Dallas's satisfaction, he and Barney climbed into the six-by and bumped down the hill to the Viking camp. Dallas wore his pistol, had a submachine gun and bandoliers of ammunition slung over his shoulders, and unloaded some heavy and sinister metal boxes. They were the last ones inside the walls and the big double gate, with the long wooden bar to lock it, was closed behind them. From the firing step Barney could see the truck back into position on the crest of the hill above.

"What makes the noise?" Ottar asked.

"I haven't the slightest idea," Barney told him. "Here they come!"

There was a ripple of motion that spread across the bay as the skin boats started in.

Barney rested the 35mm camera against the top of the log stockade and panned across the line of advancing boats. Sunlight slashed down through an opening in the clouds and glinted from the spray and the chopping blades of the countless paddles. It was a grim, steady advance, and the blackness of the boats and the clothing of the men gave them the uniform of an army of darkness. The outlandish and frightening noise grew louder as the boats approached, and Barney clutched the camera and kept shooting, glad of the task that kept him busy. He had the feeling that, if it hadn't been for that, he would have turned tail and run.

"I've heard that noise before," Dallas said. "The same kind of humming whistle, only not so loud."

"Do you remember where?" Barney asked, zooming the lens in for a closeup of one of the leading boats. It was very close.

"Sure, Australia. They have these natives there, what they call Abos, and a witch doctor was spinning this stick around and around his head on the end of a piece of string so it made the noise."

"A bullroarer, of course. A lot of primitive tribes use them and they are supposed to have magical qualities. I'm beginning to see why, with a sound like that. There must be an Indian in each boat who is spinning one."

"I have magic here to fix their magic," Ottar said, whirling his ax over his head.

"Don't look for trouble," Barney said. "We have to avoid a fight if we can."

"What?" Ottar shouted, shocked to the bottom of his Viking spirit. "They want fight—we fight. No cowards here." He glared at Bar-

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ney fiercely, daring him to answer.

"They're landing," Dallas said, stepping between the two men.

Any doubt about the peaceful nature of the visit had now vanished. As each boat landed the occupants dragged it up onto the shore and took out spears, bows, and soft quivers of stubby, stone-headed arrows. Barney concentrated on close-ups. Gino, filming the entire action, would get the details of the weaponry in entirely too much detail.

"Ottar," Dallas said, "tell your people to get under cover and keep their heads down."

Ottar grumbled but issued the order. The Viking personality did not adjust easily to the concept of defense, but it was not completely suicidal. The defenders inside the walls were outnumbered at least twenty to one and even the combative northmen were forced to respect these odds. The first arrows hummed by and a spear thudded into the wood just below the camera. Barney dropped down and pushed the lens through a chink between two logs. It limited his field of vision—but was a good deal healthier.

"Coward weapons," Ottar muttered. "Cowards. No way to fight." He rattled his ax angrily against his shield. The Vikings scorned the use of the bow and arrow and believed only in the value of shock tactics and hand-to-hand fighting.

An impasse was reached when all the boats had unloaded and the Cape Dorset men surged around the log palisade looking for a way in. Some of them tried to climb the wall, but instant decapitation, or dismemberment, by the flashing Viking axes quickly halted this. The attackers waved their weapons and shrieked in their high-pitched voices, while the humming whistle of the bullroarers rose above all the other sounds. There was a small knot of men, to the rear of the others, that Dallas pointed out.

"Looks like the chiefs, or whatever, there. Dressed different, some kind of fur outfits with fox tails hanging off them."

"Medicine men, more likely," Barney said. "I wonder what they're up to?"

There was a concerted stir of action that appeared to be organized by the men in fur-fringed outfits. Under their direction some of the attackers were running to the nearby forest and returning laden with branches.

"Are they going to try and break the wall down?" Barney said.

"Worse than that, maybe," Dallas said. "These Dorsets, do they know anything about fire?"

"They must. Jens told me that fire pits and ashes were found in the ruins of their houses."

"That's what I was afraid of," Dallas said gloomily, and pointed to the base of the wall where a mound of brushwood was being piled up.

All of the Viking spear poking

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and sword- and ax-waving was to no avail; the pile mounted higher. A minute later a man burst from the group of leaders in the rear, running through the shouting mob carrying a flaming torch. Viking spears rained down around him but as soon as he was close enough he whirled the torch so it flared up and threw it in a high arc into the mound of brushwood. The dry wood crackled and flamed and smoke billowed out.

"I can put a stop to this whole thing right now," Dallas said, bending to open the steel boxes before him.

"No," Ottar said, putting out a restraining hand. "They want fight, we fight. We take care of that fire."

"Maybe—but you'll get butchered doing it."

"Butcher some, too," Ottar said with a wicked grin as he started down from the wall. "And Barney wants good pictures of fighting Indians."

Barney hesitated, but it was impossible to ignore the meaning in Dallas's level, expressionless stare. "Sure I want a movie," he burst out. "But not at the expense of anyone's life. Let Dallas handle them."

"No," Ottar said, "we'll give you a good fight for your movie." He roared with laughter. "Do not look so sad, my gamli vinr*, we fight for ourself, too. You will go soon and when we are alone we want these *skraelling* to remember what northmen are like in battle." Then he was gone.

"He's right," Dallas said. "But if he gets into trouble we oughta be ready to get him out." He opened the largest box and took out a weatherproof loudspeaker and a coil of insulated wire. "I'm going to put this up as far along the wall as the wire will reach."

"What is it?"

"The speaker for this curdler unit. Let's see how the natives act when they get a blast of this."

Ottar had massed all of his fighting men inside the gates, leaving just the women and the bigger children to man the walls. Two women stood ready to swing the gates open and, Barney saw with a shock, one of them was Slithey. He had thought her safe back in the camp. He shouted to her at the same moment Ottar raised his ax and his words were lost in the roar of Viking voices as the gates swung wide and the northmen rushed out. The two women hurriedly closed the gates.

This was the kind of fighting the Vikings did the best—and enjoyed the most. In a howling, compact mass they burst forth and crashed into the Cape Dorset. The superior numbers of the Dorset made no difference, for there was little or nothing they could do to fight these northern butchers, impregnable behind their shields and metal helms. They were, indeed, butchers and their short swords and axes chopped

*Old friend.

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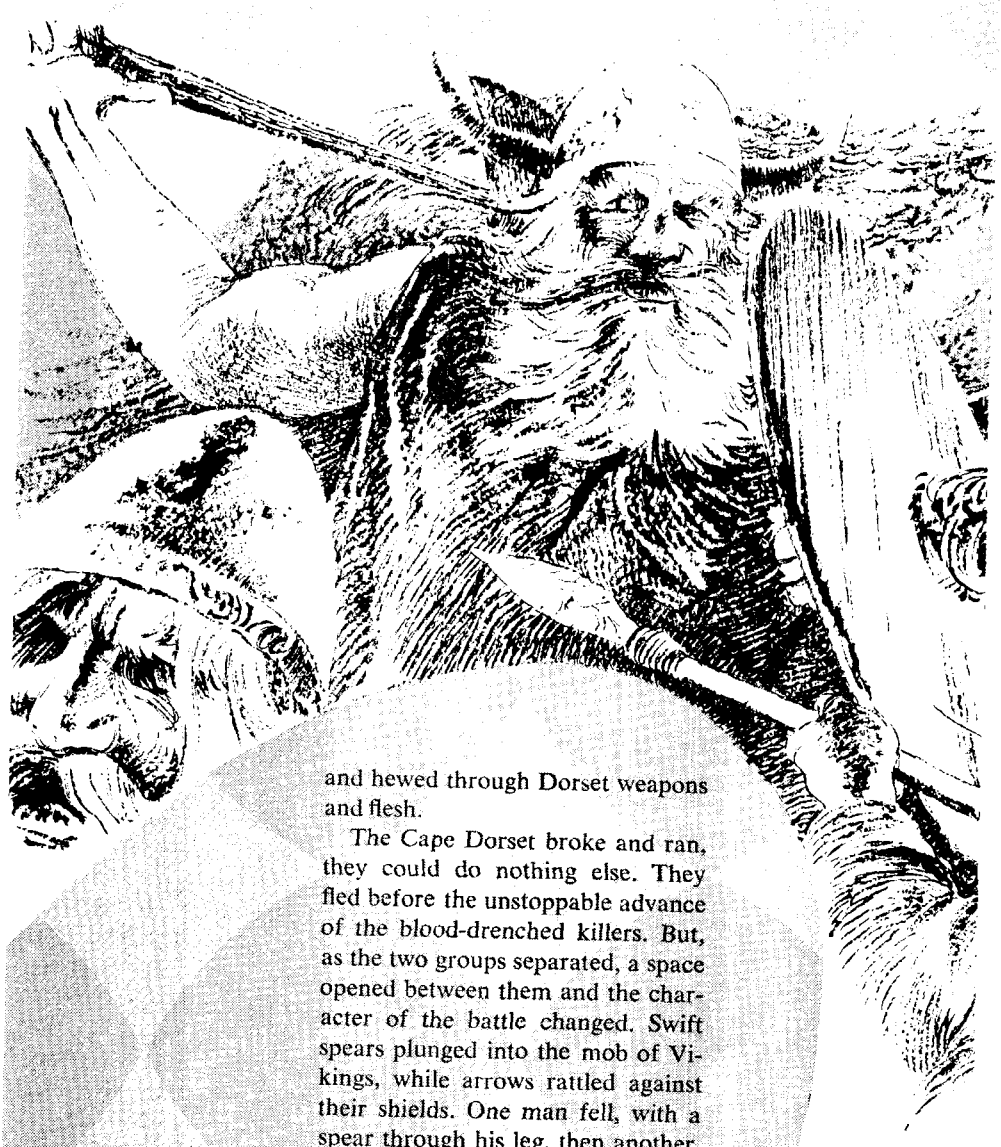

and hewed through Dorset weapons and flesh.

The Cape Dorset broke and ran, they could do nothing else. They fled before the unstoppable advance of the blood-drenched killers. But, as the two groups separated, a space opened between them and the character of the battle changed. Swift spears plunged into the mob of Vikings, while arrows rattled against their shields. One man fell, with a spear through his leg, then another. The Cape Dorset began to realize what had happened and stayed clear, letting their weapons speak for them. The Vikings could not get to grips with the enemy—and close

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contact was the only way they could fight. In a few moments the tide would turn. They would be surrounded and picked off and killed, one by one.

"If you can do anything," Barney said, "now's the time, Dallas."

"Roger. I got the only set of ear plugs so, if I were you, I would put my fingers in my ears."

Barney started to answer him as Dallas threw the switch, and his voice and all the other sounds were instantly obliterated. As the wailing, sense-destroying thunder of the curdler suddenly exploded there was nothing else he could do except jam his fingers into his ears and clutch at his head. Dallas nodded with satisfaction and dug smoke- and tear-gas grenades out of the other box. With a professional, straight-armed pitch, he began lobbing them over the wall.

With his hands clamped tightly to his head, Barney turned painfully and looked down. In those few seconds the scene had changed completely. The curdler and the bombs were as strange to the Vikings as to the attackers, but their reaction had been their natural one of drawing into an even tighter defensive knot. But not so with the Cape Dorset. They were overwhelmed by panic. The fearful noise tore at their ears. Pillars of choking smoke sprang up all around them and they could not breathe and they could not see. Without conscious thought or decision they broke and ran for the boats. Where, a minute before, there had been an attacking army, there was now only a mob of fleeing, struggling figures and a scattering of motionless dark bodies on the ground. It was all over. The mob on the beach struggled for possession of the boats and a few last figures stumbled through the clouds of tear gas after them.

Ottar's men stood together, facing outwards and ready to take on all enemies, human or supernatural. The ones who had been blinded by the tear gas were just as ready to fight as the others. Their courage was magnificent.

When Dallas switched off the curdler the silence seemed to beat in waves and Barney's ears were numb and still filled with that incredible and sense-destroying sound. He slowly let his arms fall and straightened up. The Cape Dorset were vanquished and fleeing, there was no doubt of that: the Viking warriors had lowered their shields as they realized this and were waving their weapons victoriously. Dallas's voice seemed to come from a great distance through many layers of cotton batting, as he pointed towards the truck still stationed on the hill above.

"They never bothered the truck or the camp, so Gino must have been grinding away all the time." He looked down at the laughing northmen who were tearing the burning wood away from the wall.

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"There's your Indian battle so it looks like there's your film."

Barney turned away from the dead and wounded and began to climb shakily down.

XVIII

"This is the sunset we've been waiting for, Barney," Charley Chang said. "Look at those colors."

"Let's roll then," Barney said, glancing around at the film company on the hillside. "Are you ready, Gino?"

"Just about two minutes more," the cameraman said, peering through the viewfinder of the camera. "Just as soon as that line of clouds moves in front of the sun so I can shoot right into it."

"O.K., then." Barney turned to Ottar and Slithey in their best Viking costumes; Ottar with a rubber scar and gray touches, that were hard to see, on the hair at his temples. "This is the last scene, the really last scene. I waited until now to get the color right. Everything else is in the can. It's going to run, one, two, three, but we're going to shoot it one, three and do two last to get you in silhouette against the sunset. Now in one I want you to walk up the hill, side by side, take it slow, and stop right there at the top where that line is scratched into the ground. You just stand there, looking out to sea, until I shout *now,* then Slithey you reach out and take Ottar by the arm. That's the end of the first scene. Then Ottar you put your arm around her waist and I want the two of you to hold it that way, while we dolly back for the closing scene of your figures small against the sunset. Got that?"

They both nodded.

"Ready," Gino called out.

"One sec more. When I shout cut you stay there on the hill so we can run the camera in and shoot number two which is the talk. Is that clear?"

It went off well. Ottar was almost a professional by this time. At least he usually followed orders without arguing. They climbed the hill together and looked into the sunset. Boards had been laid over the grass to make a smooth track for the camera dolly to roll along, and the grips, goaded by Barney's shouted instructions, moved it slowly and smoothly away so the figures of the lovers could fade into the distance.

"Cut!" Barney shouted when the dolly reached the end of the track. "Principals—just hold it on the hill. Let's move before the light goes."

There was a concerted and organized rush, while the camera was being trundled to the top of the hill and the sound men were setting up their tape recorder and mikes. Slithey was frowning over her lines while the script girl read his aloud to Ottar. The sky was a flaming red as the sun dropped towards the sea.

"Ready," Gino said.

"Camera," Barney called out,

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"and not a sound from anyone, not anyone. Action."

"Out there," Ottar said, pointing, "out there somewhere over the sea is our home. Do you still miss it, Gudrid?"

"For a long time I did, but not any more. We have fought and died for this land and it is ours now. Vinland . . . this new world, that is our home now."

"Cut. Good, print that. I guess that just about winds it up."

Everyone cheered then, and Slithey kissed Barney and Ottar crushed his hand well. It was a very exciting moment because the picture was just about finished in most particulars, and by the time the closing scenes were cut, scored and spliced the film would be complete. The party that evening promised to be a very big party indeed.

It was. Even the weather cooperated and as long as the radiant heaters were left on, the end of the mess tent could be rolled up. They had turkey and champagne, four kinds of dessert and unlimited drink, and all of the company and most of the northmen and a few of their women were there. It swung.

"I don't want to go," Slithey wailed and dripped tears into her champagne. Barney patted her free hand and Ottar squeezed her thigh affectionately.

"You're not really going—or abandoning your baby," Barney explained for about the twentieth time. He marveled at his own patience, but everything was different tonight. "You know Kirsten will be a wet nurse if you have to be away for a while, but there is no reason for you to be. And you have to admit that having a baby with you right in California, when you weren't even pregnant last week, would be hard to explain. Particularly during the publicity for the film. So all you do is wait until the film is released, by which time you will have decided just what you want to do about the baby. Remember, you aren't even married in California and they got a word for that kind of thing. Then, soon as you decide you come back here, the Prof has promised to bring you back no later than one minute after you left. What could be simpler?"

"It will be months and months," Slithey cried, and Barney started to explain for the twenty-first time when Charley Chang tapped him on the arm and handed him a fresh drink.

"I've been talking to the Prof about the nature of time," Charley said.

"I do not want to talk about the nature of time," Barney told him. "After the last couple of weeks I would like to forget about the whole thing."

It had been a trying time for a number of them. Over four days had passed in California—it was now Thursday afternoon on the vremeatron's time-of-arrival clock—

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and it had been a very busy four days indeed.

They had been shuttling back and forth to the lot very often to do some of the more technical cutting and dubbing in the labs there. Spiderman and his band had been recording the sound track in one of the studios. There had been much doubling back in time so the facilities could be used on an almost twenty-four hour a day basis, and in many cases the same people had crossed in the same time. Barney had one memory of three Professor Hewetts talking animatedly together that he would just as well like to forget. He sipped his drink.

"No, really," Charley Chang insisted. "I know we're all going a little bugs from almost shaking hands with ourselves, but that's not what I mean. The thing is like why are we shooting the film here at this place in Labrador?"

"Because this is the spot that the Prof brought us to."

"Correct. And why did the Prof bring us here?"

"Because this is one of the places he and Jens searched for settlers," Barney said slowly. Tonight he had patience for everybody.

"Right again. Now did you ever stop to think why Jens wanted to search for settlers here? Tell him, will you, Professor?"

Hewett put down his glass and touched his lips with his napkin. "We came here because of the excavations carried out in this area in the early 1960's by Helge Ingstad. Remains of nine buildings were found and carbon-14 dating of charcoal fragments on the sites placed them around 1000 A.D."

"Do you dig what that means?" Charley asked.

"Elucidate," Barney said abstractedly, humming along with the throbbing tones of "A-Viking We Will Go," the theme song of the picture, that Spiderman was playing softly in the background.

"It is now the year 1006," Charley said. "And there are nine buildings in the camp below, two of which were just shells to begin with that we have burned to charcoal for the picture. So there is a Norse settlement here in Epaves Bay in the Eleventh Century because traces of it were found in the Twentieth Century. So you could say there is a circle in time with no beginning or end. We came here to leave traces to find here to lead us to come here to leave traces . . ."

"Enough," Barney said, raising his hand. "I've had this circle in time thing before. The next thing you'll be telling me is that all the old sagas are really true and that we're responsible, or that Ottar here is really Thorfinn Karlsefni, the guy who started the first settlement in Vinland."

"Sure," Ottar said. "That's me."

"What do you mean that's me?" Barney asked, blinking rapidly.

"Thorfinn Karlsefni, son of Thord Horsehead, son of Thorhild

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Rjupa, daughter of Thord . . ."

"Your name is Ottar."

"Sure. Ottar is the name people call me, short name. Real name is Thorfinn Karlsefni, son of Thord—"

"I remember some of the Karlsefni saga," Charley said. "I researched it for the script. In the saga he was supposed to have come here by way of Iceland and to be married to a girl by the name of . . . Gudrid."

"That's Slithey's name in the film," Barney choked out.

"Wait, that's not all," Charley said in a hollow voice. "I remember that Gudrid was supposed to have had a baby in Vinland, and they named him Snorri."

"Snorey," Barney said, and felt the hackles rise on the back of his neck. "One of the seven dwarfs from 'Snow White'—"

"I don't see what everyone is so concerned about," Professor Hewett said. "We have known for some weeks now about these circles in time. What you are discussing now are the mere mechanical details of a single circle."

"But the significance, Professor, the significance," Barney said. "If this is true, then the only reason that the Vikings settled in Vinland is because we decided to make a motion picture showing how the Vikings settled in Vinland."

"It's as good a reason as any other," the professor said calmly.

"It just takes a little getting used to, that's all," Barney muttered.

Everyone said afterwards that it was a very memorable party and it lasted right through until dawn and very little work got done the next day. But the pressure was off and there was no need for the overwhelming majority of the company now. They moved away a few at a time, some for a holiday on Old Catalina, though most of them wanted to go straight home. They left, waving their pay cards happily and lights burned all night in the payroll department of Climactic Studios.

When the film was completed to Barney's satisfaction and a print had been made and was in the cans, there were only a handful of people left in the camp, and most of them were the drivers needed to move the convoy out.

"You're not going to smell fresh air like this again for a long time," Dallas said, looking down the hillside at the Viking settlement below.

"I'm going to miss more than that," Barney said. "I'm just beginning to realize that all I have been thinking about is the film, and now that it's done, well, this has been something a lot bigger than any of us realized at the time. You understand?"

"I dig. But you have to remember a lot of Joes only got to see Paris because the Government sent them there to kill Krauts. Things happen, that's all; things happen."

"I suppose you're right." Barney chewed at the palm of his hand.

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"But don't say it. Sounds too much like the Prof's circles in time."

"What's wrong with your hand?" Dallas asked.

"Looks like a splinter," Barney said.

"You oughta get the nurse to take it out before she locks up shop."

"You're probably right. Pass the word, we start moving out in ten minutes."

The nurse opened the trailer door a crack and peered out suspiciously. "I'm sorry, everything is locked up."

"I'm sorry, too," Barney said, "unlock it. This is a medical emergency."

She sniffed at the scope of the emergency, but unlocked the instrument cabinet. "I can't reach it with the tweezers," she said, with what sounded not unlike a note of malice, "so I'll have to cut just a tiny bit with the scalpel."

The operation took only a minute and Barney's thoughts were on more pressing matters until she dabbed iodine on the tiny cut.

"Ouch," he said.

"Now that could not have hurt, Mr. Hendrickson, not a big man like you." She rummaged through another cabinet. "I'm sorry but all the Band-Aids are gone, so I'll have to wrap a little gauze around that, just for the time being."

She had looped two turns of the bandage around his palm before he realized what was happening and burst out laughing.

"A splinter!" he said, and looked down and realized that he had put his best twill slacks on that morning, and was wearing his horsehide jacket. "I'll bet you have Mercurochrome here, in fact I'll guarantee it!"

"What a curious thing to say, of course I have."

"Then wrap this bandage on well, nice and big. I'll show him that sadistic . . ."

"What? Who . . . ?"

"Me, that's who. I treated me like that and now I'm going to get even with myself. I thinks I can treat me like that!"

The nurse did not say anything else after that, and wrapped the bandage wide and bulky the way he asked, nor did she protest when he dumped so much Mercurochrome over it so that it dropped onto her clean floor. When Barney left, chuckling to himself, she locked the door behind him.

"You hurt?" Ottar asked.

"Not really," Barney said, and reached over so that this time Ottar crushed his left hand. "Take it easy and watch out for the Indians."

"Not afraid of them! We've cut plenty of hardwood, get a fortune in Iceland. You bring Gudrid back?"

"In a couple of minutes, your time, but what happens then is up to her. So long, Ottar."

"Far heill,* Barney. You make another movie and pay with Jack Daniels."

"I may do just that."

*Good-bye

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It was the last trip and everyone else was gone and the time platform sat in the middle of an acre of flattened grass and muddy wheel tracks. The cans of film were in the pickup, the only vehicle on the platform, and Dallas was at the wheel with a red-eyed and sodden Slithey sitting beside him.

"Take it away," Barney shouted to Professor Hewett and he took one last lungful of fresh air.

Professor Hewett dropped the truck and the others off on Friday, and only Barney and the cans of film rode the loop in time back to the Monday morning of the same week.

"Leave me plenty of time, Prof," he said. "I have to get to L.M.'s office by ten-thirty."

When he arrived he phoned, then had to wait at the sound stage until the page arrived with the handcart. They loaded the film on and it was already twenty past ten.

"Bring this to L.M.'s office," Barney said. "I'll go on ahead with reel one."

Barney walked fast and as he turned the last corner he saw a familiar, hang-dog figure plodding up the steps. He smiled wickedly and followed himself down the hall right up to L.M.'s door, and the figure in front never looked back. Barney waited until he had actually pushed the door open before reaching over his shoulder and pulling his hand away.

"Don't go in there," he said.

"What do you think you're doing?" the earlier Barney shouted, then took one look at him and collapsed like a second-rate actor in a ninth-rate horror film, all shaking limbs and popping eyes.

"A very nice take," Barney said. "Maybe you should be acting in films, not directing them."

"You're . . . me . . ." the idiot figure burbled.

"Very observant," Barney said, then remembered the diagram. He would be glad to get rid of *that.* "Hold this a sec," he said, and shoved the can of film into the other's arms. He couldn't reach into his pocket with his bandaged hand so he had to grope around with his left hand and dig his wallet out. The other Barney just held the can and mumbled to himself until Barney pulled it back and pushed the diagram into his hand.

"What happened to my hand . . . your hand?" the horrified other Barney asked.

I should tell you Barney thought to himself, then saw that the page was coming with the handtruck and he opened the door for him.

"Give that to the Prof," Barney said as the page went past, then couldn't resist one last dig. "And stop horsing around and finish the picture, will you?"

He followed the page in and let the door swing behind him without a backward glance. He knew, without the slightest trace of doubt, that it would not open, and enjoyed the

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sensation of being positively *certain* of something for the first time in his life. This sureness carried him past Miss Zucker who was standing and trying to tell him something about men from the bank; he brushed her aside and opened the inner door for the page. A very pale L.M. looked up at him and six gray-haired and frozen-faced men turned to see what the interruption was about.

"I'm very sorry to be late, gentlemen," Barney said with calm assurance. "But I'm sure that Mr. Greenspan has explained everything. We were out of the country and I have just arrived with the print of the film he has been telling you about. A multi-million dollar asset, gentlemen, that will usher in a new era of cinematic art and profit for this studio."

The cans of film rattled together as the page straightened up the handcart and Sam, from the darkest corner of the room, uttered a small and almost inaudible sigh.

XIX

"You will excuse me if I don't rise," Jens Lyn said. "The doctor is very strict about rest in the afternoon."

"Sure," Barney said. "Forget it. Does it still give you trouble?"

Jens was lying on a lounge chair in the garden of his home, and looked a good deal thinner and paler than Barney remembered.

"Not really," Jens said. "It's just a matter of healing. I can get around fine; in fact I was at the opening last night. I am forced to admit that, in most ways, I rather enjoyed the film."

"You should be writing for the papers. One of the critics accused us of making a poor attempt at realism in the torn-shirt-and-dirt Russian style, and failing miserably. He claims that the crowds are obviously good American extras and he even recognized the piece of the California coast where the scenes were shot."

"I can understand his feelings. Even though I was there when the filming was done I experienced very little sense of reality while watching it. I suppose that we are so used to the marvels of the film and the strange places that it all looks the same to us. But, this negative attitude of the critics, does that mean the film will not be a success?"

"Never! The critics always pan the big money makers. We've already got our costs back ten times over and it is still rolling in. The experiment was a noble success and we are having a meeting today to talk about the next film. I just wanted to come by and see you, and well . . . hope that you weren't feeling—."

"Anger? No, Barney, that's over. I should apologize for losing my temper like that. I see things in a totally different perspective now."

Barney smiled broadly. "That's the best news yet. I admit you had

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me bugged a good bit, Jens. I even brought a peace offering, though Dallas is the one who got it and asked me to bring it to you."

"My goodness," Jens said, opening the package and taking out the length of notch-edged, flattened wood. "What is it?"

"A bullroarer, Cape Dorset brand. They were spinning them when they attacked Ottar's camp."

"Of course, that's what it is." Jens took a thick book from the table near his head. "How very nice of you to think of me, and you must extend my thanks to Dallas when you see him. You know, a few of the people from the company have dropped in on me, and I've heard a good deal about everything that happened after I left. In fact I have been reading about it as well." He pointed to the book and Barney looked puzzled.

"These are the Icelandic Sagas, in the original Old Norse in which they were written. Of course most of them were just verbal history for about two hundred years, before they were transcribed, but it is amazing how accurate they can be. I'll read you a bit from the Thorfinn Karlsefni Saga and the Greenlanders Story. Here . . . 'at the end of this time a great multitude of *skraelling* were discovered coming from the south like a river of boats . . . they had staves waving countersunwise and were all uttering loud cries.' The staves must have been the bullroarers, such as this one."

"Do you mean that Ottar . . . Thorfinn . . . and everything that actually happened to him is in these sagas?"

"Everything. Of course parts are missing and it is a bit confused, but two hundred years of word-of-mouth is a long time. But his voyage, the building of the settlement, the attack of the *skraelling*—even the ice cream and the bull that frightened them on the first visit—it's all in here."

"Does it say what . . . finally happened to him?"

"Well, it is obvious from the fact that the reports were recorded that he lived to return to Iceland, or to pass on the story of his adventures to other Norse who came that way. There are different versions of his later life, but all agree on his prosperity and long and happy life."

"Good for Ottar, he deserves it. Did you know that Slithey went back to him?"

"The Gudrid of the sagas, of course. I read an item in the paper about it."

"Yes, it was obvious her press agent didn't write it. Something about retiring from films to be with the only man I love and the sweetest baby in the world, on his ranch which, while the plumbing isn't very good, is very nice and friendly and with plenty of fresh air."

"That was it."

"Poor Slithey. I wonder if she has any idea where—or when—that ranch is?"

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Jens smiled. "It doesn't really matter, does it?"

"You're right about that."

Jens took a Xerox copy from the back of the book. "I've been saving this for you, in case you came by. One of my students ran across it and thought it might amuse me. It's a copy of an item from the New York *Times*, 1935 I believe."

"Disturbance upsets meeting," Barney read. ". . . Congress of the Archeological Society disrupted when two attendees scuffled in the anteroom . . . threats of suit for slander . . . claims that Dr. Perkins attempted a hoax by presenting the fragment of a glass bottle claiming that he found it in a Norse midden-heap in Newfoundland. Declared a fraud because this particular form has never been associated with any of the northern cultures, it appears to be too well made and, in fact, resembles the shape of container used by a well-known proprietary brand of American bourbon whiskey . . ."

Barney smiled and handed the paper back. "Looks like Ottar has had some trouble getting rid of his empties." He rose. "I hate to run off like this, but I'm already late for the meeting."

"Just one more item before you go. In these sagas a name keeps cropping up, a man who seems to have had an influencing factor on the Vinland settlements. He appears in all the sagas, is supposed to have been on one or more voyages and to even have sold the boat to Thorfinn that he used to make his journey to Vinland."

"I know, that must be . . . what's his name . . . Thorvald Eiriksson—the guy Ottar got his boat from."

"No, that's not his name. It's Bjarni Herjolfsson."

"That's very interesting, Jens, but I really do have to run now."

Barney was out in the street before he realized what Barney Hendrickson might sound like after the Vikings had passed it on by word-of-mouth for two hundred years.

"They even wrote a part in for me!" he gasped.

"Go right in, Mr. Hendrickson," Miss Zucker said, and she even smiled slightly. She was the perfect barometer and Barney knew that his stock was soaring in Climactic.

"We were waiting for you," L.M. said when he came in. "Have a cigar."

Barney took it and put it into his breast pocket as he nodded around at the others.

"How do you like it?" L.M. asked, pointing to the stuffed tiger's head on the wall. "I got the rest home making a rug."

"Greatest," Barney said. "But I never saw a tiger like that before." The head was almost a yard long and two immense canine teeth, each twelve inches or more, protruded down below the lower jaw.

"It's a sword-tooth tiger," L.M. said proudly.

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"Are you sure you don't mean sabertooth?"

"So? A saber is a kind of a sword, isn't it? Those two stuntmen . . . what's their names? . . . gave it to me. They are running some kind of safaris, hunting, you know, and Climactic is getting a percentage of the gross for no investment except they use some of our equipment."

"Very nice," Barney said.

"Which is enough," L.M. said, rapping on the desk with his gold lighter. "I'm as sociable as the next guy, maybe better, but we have some work to do. We have to plan at once immediately to follow up the smash success of 'Viking Columbus' with an even more smashing success and that is what we are here to decide about today. Just before you came in, Barney, Charley Chang commented that religious pictures are swinging up on the charts again."

"I wouldn't doubt it," Barney said, then sat bolt upright. "L.M., no . . ."

But L.M. was smiling and not listening. "And that," he said, "gives me an idea for the outstanding religious picture of all time, a theme that positively cannot miss!" ■

The Analytical Laboratory

The An Lab is based on your votes; it pays authors bonuses in nice cash money, as determined by your opinions of their works. (This is a technique whereby the Editor can duck out when the irate author says: "Sir, you have no taste! You have no Artistic Sense! That was my greatest story!" by simply saying: "Well—the cash customers didn't think so, so maybe it wasn't!)

However, this requires your cooperation—i.e., your votes. Sent in by postcard, letter, or full-blown fulmination. Just let us know in what order you rank the stories, as to #1, #2, et cetera. The story that gets the most #1 votes gets a 33% bonus. Analog pays cash on acceptance of a story, about $300 to $450 for a novelette. If it wins first place, that means a second check for $100 to $150, depending on length. If an author's done you the favor of giving you some first-class entertainment—you can reward him in a way that counts (literally!) by sending your vote of thanks.

In the January issue, your votes came out thus:

PLACE	STORY	AUTHOR	POINT SCORE
1.	Amazon Planet (Pt. 2)	*Mack Reynolds*	2.00
2.	Supernova	*Poul Anderson*	2.31
3.	The Last Command	*Keith Laumer*	3.10
4.	A Criminal Act	*Harry Harrison*	3.55
5.	The Old Shill Game	*H. B. Fyfe*	3.70

THE EDITOR.

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P. Schuyler Miller

LARK SONG

I had hoped that Pyramid Books would publish its paperback edition of "Skylark Duquesne"—fourth and last of Dr. E. E. Smith's epoch-making "Skylark of Space" series—in time for me to make my review of "Doc's" last book a tribute to his place in science fiction. Perhaps it is just as well that Advent: Publishers came first with their "The Universes of E. E. Smith," by Ron Ellik and Bill Evans, for now that it has come (Pyramid Books No. X-1539; 238 pp.; 60¢), "Skylark Duquesne" is something of a letdown. It isn't as good as the earlier "Skylark" books, and it by no means measures up to the great "Lensman" series that appeared here in Astounding in its first and best version between 1937 and 1947. Yet its very shortcomings point up the two totally different things Doc Smith did in his two major series.

"The Skylark of Space" appeared in *Amazing Stories* in the summer and fall of 1928, though it had been written by 1918. "Skylark Three" followed in 1930 and "Skylark of Valeron"—here in Astounding—in 1934. More than thirty years elapsed before Doc closed the series with the serialization of "Skylark Duquesne" in *If*. The present paperback and the companion volumes Pyramid is publishing may be the only book format the story will ever have.

At the Discon, a few years ago, I said that the "Skylark" stories had been a "snow job." I don't think Doc misunderstood.

The connecting theme of the "Skylark" books is the gradual discovery of a physical universe unknown to physics. John Campbell to the contrary, it wasn't the concept of island universes that made the series great; pioneering as the

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idea was in 1918, it was less novel in 1928 and most of the new generation of science-fiction readers accepted it instinctively. But this was the era when laymen and high school students were told in the press and the popular magazines that great and fantastic discoveries were being made almost daily about the fundamental "secrets" of space, time and the atoms. We were told—and believed—that only twelve men in the world could understand the concepts of relativity.

Doc Smith, in the "Skylark of Space" series, convinced us that he was giving us an insider's glimpse of these secrets. Bit by bit, like working toward the heart of an artichoke, he took us down through the "orders" of cosmic structure—they're described under "rays" in the Advent concordance—and made every step logical and believable. Of course, the whole structure was fantasy—but we believed in it. It was a superb snow job.

This, I think, explains why new readers don't seem to care for the "Skylark" series as we did, and why "Skylark Duquesne"—which carries on the same process and theme—disappoints even us old converts. Kids nowadays learn, even in the grades, that the real physical universe isn't like the universe of Seaton, Crane and their friends, and enemies. The illusion never starts and never has a chance to build up.

The "Lensman" series, on the other hand, used the same central technique of an unfolding secret, of wheels within wheels that grew seemingly clear at the end of one story, only to collapse into new mystery in the next. But this time it was a *human* story—the cosmic conspiracy of Eddore against Arisia and against the galactic Civilization of all races-of-good-will—as it was slowly revealed to Kimball Kinnison and the other Lensmen. There were rays and forces that never existed in a physics handbook, but they were tools and effects, and the suspense and mystery grew and grew and grew through story after story, book after book. And still does.

There are indications that if Doc Smith had lived, he intended to tie the universe of the "Skylark" stories to some of his other books. In "Skylark Duquesne," Seaton and the chief scientist of the other-galactic Jelmi are working on a theory of the four-dimensional "Gunther Universe" which is the central concept of "The Galaxy Primes," and Dorothy Seaton comments somewhere that Kay-Lee Barlo, the "witch" who is the brightest bit of the story, has said she, too, has the makings of a Prime Operator. The atmosphere and concepts of "Subspace Explorers"—not yet in a Pyramid edition as all the "Skylark" and "Lensman" books now are—fit somewhere into the same *gestalt*. Perhaps someone sharper than I and than Ellik and Evans—whose concordance is an invaluable help in checking up on what is happen-

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ing—will discover the matching edges or add the missing pieces.

The "Skylark" series were a tremendous force in driving modern science fiction along the path it has followed, but the "Lensman" stories paved the road.

MAKE ROOM! MAKE ROOM!
By Harry Harrison • Doubleday & Co., Garden City, N.Y. • 1966 • 216 pp • $3.95

The jacket calls this "a realistic novel of life in 1999" . . . and so it is. If you expect the stereotypes of the over-population story, they're not here. The book is extrapolation that the author means to be taken seriously, and he appends a page and a half of collateral reading in the hope that you will do so.

In one of the collection of Analog editorials that Doubleday has just published, "Note for Chemists," John Campbell points out that Mankind is creating on Earth an artificial ecology of symbiotic life forms incapable of survival outside our intricate social structure. This is also the message of Harry Harrison's book: we are building to a point where it will take all our skills and energy to hold our level, and where the least imbalance means collapse and destruction.

In 1999, New York is a city of thirty-five million people dangling from the administration's fraying shoestrings. Food is synthetic and expensive; water is rationed; electricity is gone; living space is almost nonexistent. A few work, like Andy Rusch, a city detective; others prey on each other, like the politician Michael J. O'Brien, who can afford meat every day and a mistress like Shirl Green. The rest are preyed upon, like eighteen-year-old Billy Chung, a refugee from the Red Chinese envelopment of Taiwan, living in the rusting mothball fleet that has been brought down the Hudson to help house the overflow of Manhattan.

Robbing O'Brien's apartment, Billy is caught and kills the politician. The murder brings Andy and the girl together, and the stage is set for the inevitable end in misery and destruction. There is no happy ending; it is Harry Harrison's point that there can be no happy ending. We probably do not have it in our power to bring one about, except by limiting population, putting an end to waste, abandoning the easy way.

If your friends complain that science fiction is a daydream literature for escapists, give them this one.

THE WITCHES OF KARRES
By James H. Schmitz • Chilton Books, Philadelphia • 1966 • 202 pp. • $4.95

I don't think any reader of this magazine—at least, anyone reading it in December 1949—will ever forget the novelette that first used this name and introduced the three little witches of Karres: Goth, Ma-

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leen and the Leewit. It was the author's second story here, following the equally memorable "Agent of Vega," and it established him as one of the major talents in the field in about the same way A.E. van Vogt's "Black Destroyer" and "Discord in Scarlet" had established him exactly ten years before. In spite of the landmark books that have come from the van Vogt typewriter, Schmitz is a much better writer, and he proves it to any jury by converting the novelette of 1949 into the equally striking and totally different novel of 1966.

This is the same far future in which the Vegan agent operated, in which there was "A Nice Day for Screaming" among the worlds of the Hub, in which Mankind has scattered among the stars, bred into peculiar forms and developed peculiar powers, formed itself into empires and trading leagues. Captain Pausert of Nikkeldepain is out to make his fortune and marry the boss's daughter when he makes the serious mistake of rescuing one of the three little witches from her overwrought owner, and is then persuaded—contrary to the strict injunctions of his own society—to buy her two sisters as well. They are grateful, especially young Goth, who attaches herself to her benefactor, and applies herself vigorously to helping him in spite of himself.

There follow espionage, piracy, assorted forms of mayhem, and a freewheeling galactic war that nobody knew was in progress. Needless to say, Pausert and Goth win it with some assistance from Maleen, the Leewit, their relations, and Pausert's reprobate great-uncle Threbus—who happens to be the witches' father. You will, in the process, encounter such things as Worm Weather, klatha hooks, and a vatch to end all vatches . . . not to mention grik dogs and Nartheby Sprites and Sheem Robots.

This is going to be up there in the finals for the 1966 awards, both fannish and professional, and if an equally fine job had not been done of expanding Daniel Keyes's "Flowers for Algernon" to novel length, James Schmitz might well be clearing space on the mantle for both awards right now.

RETIEF'S WAR

By Keith Laumer • Doubleday & Co., Garden City, N.Y. • 1966 • 208 pp. • $3.95

I said, when I reviewed "Galactic Diplomat," that I preferred Jame Retief's misadventures with human blunderers and nogoodniks to his brushes with alien critters who were merely protecting their own interests. This full-lengther, reprinted from *If* with the grand Gaughan illustrations, is something else again. It isn't going to win any prizes, and it probably won't make any future "Best SF" lists—though Keith Laumer is climbing fast—but it never lets down.

Maybe Retief's creator remem-

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bers the Wheelers of Oz as fondly as I do: they and Tik-Tok were in the first Oz stories I ever read. At any rate, the beings of Quopp combine the best—and worst—features of insects and organic machines. They are even more specialized than ants and termites, and so are their dispositions. Human meddling, if for the best of motives, is doing nothing but breed chaos, so Retief has to get in there, inside a false shell, and straighten things out.

Needless to say, he has to cope with the doggedly venal stupidity of his boss, Earth Ambassador Longspoon, and the underground machinations of the villainous Groaci, Earth's hereditary enemies in the galaxy, as well as the more spontaneous intrigues of the native Quoppina. Needless to say, he does. These plots are not subtle, and Retief is no Establishment anti-hero. I'd like to see Douglas Fairbanks Jr. come out of retirement and play him.

WATCHERS OF THE DARK
By Lloyd Biggle, Jr. • Doubleday & Co., Garden City, N.Y. • 1966 • 228 pp • $4.50

Jan Darzek, the 1988-vintage detective whom we met in "All the Colors of Darkness," is operating on a galactic scale in this one. Mysterious invaders from outside our galaxy are swallowing up one world after another, and agents of the computer that coordinates a federation of civilized worlds hire Darzek to track down "the Dark." Needless to say, his Gal Friday, Miss Effie Schlupe, comes along to lend a vigorous and effective hand.

This one isn't up to the first book. Details are wonderful, particularly the episodes when Darzek is masquerading as Gul Darr, the eccentric galactic trader. However, the Dark's secret weapon is a little too subtle to be convincing and I refuse to believe that natural selection would not have left a few maverick individuals immune to it on all the worlds the invaders took over.

THE ULTIMATE WEAPON
THE PLANETEERS
By John W. Campbell • Ace Books, New York • No. G-585 • 106 + 150 pp • 50¢

The John Campbell you meet in this book is the young writer of the 1930s who in these stories—a long novelette or novella and a series of five short stories—had snatched the ball from such different writers as Dr. E. E. Smith and Stanley G. Weinbaum, and was running hard for the goalposts.

Weinbaum, with "A Martian Odyssey" and its successors, had initiated the "screwy animal" school of science fiction. Pioneering monsters had already established their place in the magazines, but Weinbaum's Tweel and his companions were creatures that completely stole their stories from the nominal heroes. John Campbell promptly moved in with his "Penton and Blake" series in *Thrilling Wonder*

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Stories, collected here. His critters were scientifically as well as physically peculiar, and a delight to chemistry classes as well as to the unlettered who simply enjoyed them. Penton and Blake are physicists who have illegally developed a more practical brand of atomic energy than we yet enjoy, and who escape for a tour of the planets, including a still-unknown tenth planet beyond Pluto. The high point comes with their encounter with the borax-eating Callistan "dog," Pipeline, but the other stories are good fun, too.

They are also dated in a rather peculiar way. The economics are the economics of the Depression years. A million dollars are a lot of money. There are unknown elements that can be as peculiar as you please. Both planets and satellites have to be inhabited by intelligent beings, or there would be no story. Later, as editor of Astounding and as "Don A. Stuart," John broke the mold. In this case and at this time he was using it very well.

"The Ultimate Weapon" was called "Uncertainty" when it appeared as a two-part serial in *Amazing Stories* in 1936. This time John, making good use of his work in atomic physics at M.I.T. and Duke, was outdoing "Doc" Smith at his own world-wrecking game. The great difference was that, with all due respect to "Doc" as a marvelous storyteller, the physics of his "Skylark" yarns was pure hokum that sounded so plausible and came at you so fast that you never recognized it as nonsense. John also remade the laws of physics to suit his needs, but he keyed them into reality more deftly and every reader confidently expected to see his wonders reported in the Sunday supplements right after Easter.

In one of the Analog editorials that Doubleday has collected in book form, "No Copying Allowed" from 1948, John demolished the old SF stereotype in which the physicist hero captures a weapon or space drive from the extraterrestrial monsters, looks it over thoughtfully, and goes into the back room to (a) duplicate it, (b) invent a defense, and (c) produce another weapon that tops it. This is precisely the formula that he used smoothly in "The Ultimate Weapon," twelve years before, and in many another yarn before and after.

Paperback Classics

ISLANDIA

By Austin Tappan Wright • Signet Books, New York • No. Y-2870 • 944 pp. • $1.25

Here is the first paperback edition of the gigantic imaginative classic about the peculiar society on a lost continent in the Pacific. Even this is a massive condensation of a chronicle that originally ran to some 600,000 words and was rounded out by hundreds of thousands of words of supplementary and supporting material, like the appendices

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to Tolkien's "Lord of the Rings" trilogy. Though the introduction by Wright's daughter does not say so, all or most of this additional, unpublished material was "lost"—and probably stolen—en route between Philadelphia and New York. I hope that, like some of the world's lost art treasures, it is lying in some now middleaged fan's collection, and will some day come to the surface. Still, if a teen-ager got it his mother probably threw it out, and if an ordinary thief took it, it is either ashes or a wad of pulp in the bottom of a Philadelphia dump. Time machine, anyone?

EXPLORERS OF THE INFINITE

By Sam Moskowitz • Meridian Books, Cleveland • No. M-202 • $1.95

The first of Sam's two books—which should become three—on the men who have made science fiction. This one covers the era of the "shapers of science fiction" (his subtitle), from Cyrano de Bergerac to Stanley Weinbaum.

HOPALONG-FREUD AND OTHER PARODIES

By Ira Wallach • Dover Publications, New York • No. T-1547 • 120 pp. • $1.00

This is listed here for two of the seventeen parodies: "Worlds in Collusion" and "Get Off My Galaxy!" They come from two of Wallach's parody volumes, "Hopalong-Freud and Other Modern Literary Characters" and "Hopalong-Freud Rides Again."

THE POISON BELT

By Sir Arthur Conan Doyle • Berkley Books, New York • No. F-1203 • 158 pp. • 50¢

This includes three of the Professor Challenger stories: the title novel and the two shorter stories, "The Disintegration Machine" and "When the World Screamed." With the better-known "Lost World" (Berkley No. F-1162) they comprise the entire Challenger series except for "The Land of Mist," in which Challenger turns spiritualist as Doyle himself had done.

MASTER OF THE WORLD

By Jules Verne • Airmont Publishing Co., New York • No. CL-73 • 127 pp. • 50¢

THE ISLAND OF DR. MOREAU

By H. G. Wells • Airmont No. CL-110 • 127 pp. • 50¢

THE FIRST MEN IN THE MOON

By H. G. Wells • Airmont No. CL-78 • 160 pp. • 50¢

IN THE DAYS OF THE COMET

By H. G. Wells • Airmont No. CL-111 • 192 pp. • 50¢

These paperback editions, with their special introductions by veteran fan and present editor Robert A. W. Lowndes, are part of the Airmont Classics series for schools.

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The series has included Wells' other classics, "The Invisible Man" (CL-40), "The Time Machine" (CL-44), "The War of the Worlds" (CL-45) and "The Food of the Gods" (CL-59), and I think it accounts for the unexpectedly large vote these books —especially the thoroughly off-trail "Days of the Comet" and the almost unknown (in libraries) "Food of the Gods"—got in our poll.

The Verne book was one of his last, and is the second part of the pair dealing with Robur "the Conqueror."

Reprints and Reissues

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12 GREAT CLASSICS OF SCIENCE FICTION

Edited by Groff Conklin • Gold Medal Books, Greenwich, Connecticut • No. d-1669 • 192 pp. • 50¢

Reissue of the 1963 anthology. Isn't the Conklin name enough of a guarantee?

STEP TO THE STARS

By Lester del Rey • Paperback Library, New York • No. 52-955 • 160 pp. • 50¢

Reprint of the good, but not outstanding, 1954 juvenile—one of the Winston science-fiction series that was then flourishing.

ISLANDS OF SPACE

By John W. Campbell • Ace Books, New York • No. M-143 • 191 pp. 45¢

John Campbell set new styles in space opera under his own name at the same time that he was pioneering "modern" science fiction as Don A. Stuart, and before he became editor of Astounding-to-become-Analog. This is the second in his Arcot-Wade-Morey series, which began with "The Black Star Passes" (Ace F-346).

GALACTIC DIPLOMAT

By Keith Laumer • Berkley Books, New York • No. X-1240 • 223 pp. • 60¢

The first selection of the misadventures of Jame Retief, sheepdog in diplomat's clothing in the wild, wild galaxy of a long time from now.

THE SECRET OF SATURN'S RINGS

By Donald A. Wollheim • Paperback Library, New York • No. 52-996 • 159 pp. • 50¢

The Winston juvenile SF books *were* juveniles—well above the "Tom Swift Jr." category, but by no means Heinlein or Norton. This is another of them.

TALES OF GOOSEFLESH AND LAUGHTER

By John Wyndham • Ballantine Books, New York • No. U-2832 • 150 pp. • 50¢

Ballantine is reissuing the Wyndham books in its "Bal-Hi" editions for young people, with a pedagogical foreword. You should have read the original pb edition in 1956.

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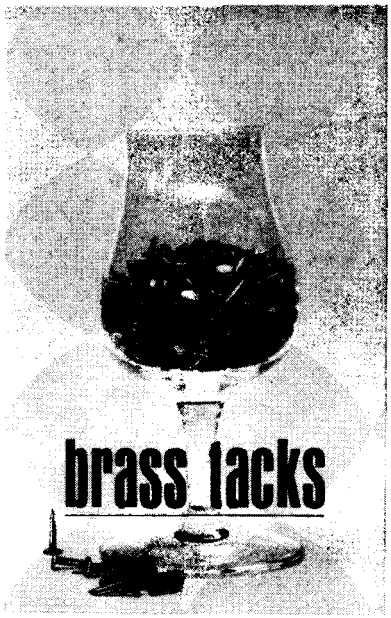

Dear John,

Congratulations on an excellent December editorial. As head of a small group of nonscientists and nonengineers—graduate, that is—with a total of eight patents in the last three years, I can readily appreciate the differences you point out. Other considerations you might have mentioned are the dangers of too much education for an engineer. This leads him to overuse a new idea or technique, i.e., his current favorite circuit, mechanism or analytic method, when a much simpler, but less scientifically sophisticated approach would work better and be cheaper and more reliable. Also, the dangers of engineers who get too removed from making it work—witness an overheard comment by a designer who calls himself an engineer: "I pity the poor sucker who has to build this." The clear, cool illogic of nonfunctioning, supposedly well designed, machinery keeping me from meeting a deadline is the most frustrating discipline I have ever encountered. After I got it working, I could go back and scientifically explain the problem, but to scientifically deduce the trouble was another matter.

One last point. Perhaps what this country needs is some good Social Engineers, men who are interested in making our society work regardless of the pseudo-scientific theories which say it can't work that way. Certainly the current status of Social Science as a predictive discipline leaves much to be desired. Perhaps if more effort were devoted to Social Engineering of the "Great Society" problems, we could get on with living while the Social Scientist develops the theories which, hopefully, will suggest the next step to be taken. Or is this what Politicians should be doing?

A. E. HOLMES

A politician IS a Social Engineer! Note that no Sociologist—Theoretician type—has ever succeeded in getting himself elected to congress. I gather their theories don't work well as Applied Sociology!

Dear Mr. Campbell:

Yesterday was Thanksgiving. At a family gathering in Santa Barbara

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we tried the levitation experiment. I took the December issue of Analog and we followed the directions (the "engineering" directions) as closely as we understood them, both with two people and with four. Result? Nothing! Zero!

Years ago while waiting for a "prop" on a movie set someone suggested trying the levitation thing as a pastime until we could go on. *It worked!* But almost immediately we went on with the scene. So it dropped out of mind and I did not try it again—until yesterday.

Yesterday *it did not work! Why?*

I wonder if age of participants has anything to do with it? (You know, "puberty and poltergeists.") Ages of participants when it did work on the set were, I guess, between twenty and forty years. This time two under twenty, but three over sixty. You understand, some sort of excess *vital* energy—perhaps a type of energy not yet identified.

Anyway I think you should know that quite responsible people tried it and found the directions and predicted result "phony"—I mean, of course, not dependable.

SPRING BYINGTON

As I said in an editorial some years ago—"We Must Study Psi!" As of now, we know so little we don't know enough to be able to say what is, and what is not, a valid experiment, and what proper experimental conditions are.

My hunch is that your failure on the recent levitation experiment was due to a "noise generator" type person. The psi noise-generator type is rather like the "party-pooper" personality—he doesn't actively do *anything at the party to louse it up, but somehow there's an aura around him that makes the jokes seem flat, the drinks off flavor, the laughter sound somehow silly . . . and yet he's doing nothing.*

Same type depressor can stop psi phenomena apparently. Yet an active, openly, and argumentatively opposed individual present doesn't!

As for age being responsible . . . ? For anyone with your vivacity, there's no difference between nineteen and ninety!

Dear Mr. Campbell:

With reference to your article on the worth of statistics in the October Analog, I feel I should draw your attention to the results of a survey recently carried out on 3,159,999,999 of the Earth's 3,160,000,000 inhabitants. You, yourself, were the exception, which is why you do not remember it. They were asked if they were acquainted with a "John Carmichael of Strathaven in Scotland." 3,159,999,499 said definitely not. The remaining 500 said that they were to varying degrees. This group, representing 1 in 7,320,000 is obviously statistically insignificant and must be disregarded. Therefore, no such person exists and I am obviously a figment of my own imagination, or possibly, that of the 500 poor deluded souls who

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share my fantasy. And now, since I (?) have been made to face up to my neurosis, it will, no doubt, gradually fade away, and myself along with it.

JOHN J. CARMICHAEL
8 Rowan Walk,
Strathaven, Lanarkshire, Scotland.

On the other hand, many thousands have heard of Mark Phillips, who is really another author of two different names, and doesn't exist except statistically.

Dear Mr. Campbell:

Here is a problem in "big bang" and "cyclic" cosmology that might interest you and your readers.

Under both theories all matter is at some time concentrated into a "cosmic egg" which explodes. This explosion is supposed to account for the observed expansion of the universe.

The problem is that when the "cosmic egg" explodes it acts as a gas. As a gas it will show a normal distribution, bell shaped, curve of velocities away from the center.

You can see that it will not form an expanding sphere of matter. It will form an expanding spherical shell around a central sphere containing almost no matter.

In a spherical shell, if you look directly toward, or away, from the center, the galactic population will thin rather rapidly; if you look along the shell the galactic population will thin very slowly.

Current observations, based on an average of all directions, show a small tendency for the galactic population to thin out at the limits of observability.

Therefore, I must conclude that either I have made a bad mistake somewhere or the universe is much larger and older than we now believe or the "big bang" and "cyclic" theories are wrong.

What do you think?

ROBERT A. TAYLOR
2409 Huffine Circle,
Johnson City, Tennessee

Maybe we need to see further and watch for a significant length of time—say a gigayear or two?

Dear Mr. Campbell:

The essay by John D. Clark is very interesting and quite enjoyable, but it contains a mistake. Since the end of 1965, the time unit is not 1/31 556 925.9747 part of a specific tropical year. The scientific second now—internationally accepted—equals 9 192 631 770 hertz, or the frequency of the transition between the hyperfine energy levels F — 4, M — 0 and F — 3, M — 0 of the fundamental state $^2S_{1/2}$ of the cesium-133 atom, imperturbed by external fields.

Incidentally, in his proposed system of elementary units, six units are not necessary. Having heat expressed as energy, he can dispose of Stefan-Boltzmann constant, and radians can be safely substituted by a suitable multiple of 2π. Thus he will be left with four elementary

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units, to wit: fire, air, water and earth in a properly chosen language. He may decide which is which.

I would also like you to convey my gratitude to Randall Garrett for the well composed and nicely written detective SF "Too Many Magicians."

J. HORZELSKI

Artro
Penrhyncoch
nr. Aberystwyth, Cards.
Great Britain

To someone accustomed to those Welsh names and words, I suppose even that definition of "One Second" doesn't seem complicated!

Dear John:

In your editorial for November, you accuse Benjamin Franklin for having guessed wrong in this matter of current versus electron flow. Since Poor Richard isn't here to defend himself, I must. The historic facts are these:

1. From the time of Thales of Miletus, it was known that some stuff attracted other stuff and some stuff repelled other stuff, depending upon which was rubbed on what.

2. The gentlemen of Revolutionary Days wore knee breeches and stockings; on cold days they wore two pair. To those who were observant, it became obvious that removing a white stocking from a-top a black one produced a charge that was opposite to the charge that was generated when the black sock was on top and removed first.

3. It was in here that Benjamin suggested that there could be positive and negative electricity or charges. Here ends Ben's contribution to the electrical confusion . . .

4. Benjamin Franklin died in 1790; in 1800, Emile Volta demonstrated the electrochemical pile that bears his name. Therefore Franklin died ten years before anybody knew for sure that a true electric current could be made to flow.

5. But once they could generate electricity without petting the cat or polishing glass rods, it was not long before Coulomb demonstrated a doodad called the "electrolytic cell" and what do you know? When Mr. Coulomb's electrolytic cell was connected to Volta's pile, stuff was removed from one electrode of the electrolytic cell and deposited on the other—obviously carried along by the flow of electrical current, wouldn't you say? Or at least have said?

So it wasn't really Poor Richard, and it wasn't a bad binary choice, it was some fairly competent observers using the only shred of evidence that was to be visible for almost a hundred and eighty years.

And even today, the semiconductor boys stoutly insist that their "holes" going north are as effective as your electrons going south.

However, what you say is true—one hell of a lot of electricity has been used for both good and useless purposes without its users knowing

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or even caring which way the arrow goes, so long as all the current flows.

GEORGE O. SMITH

Sorry George, but old Ben defined + and — in terms of rubbing glass rods with cat's fur, before Volta got into the act!

Dear Mr. Campbell:

The planet Mercury is of interest to astronomers because of its unusual orbit. Its orbital velocity is the highest of the known planets, and varies from 35.5 to 24.4 miles per second. This is so high, that it affects the timing of the light we receive from it. The time observed, from perihelion to aphelion, is slightly different from one half orbital period, that is, after allowing for gravitational influences of the other planets, and the Earth's movement, during these forty-four odd days.

Let's examine the cause of this. Mercury shines by reflected sunlight. When light leaves the sun, it is slowed, as it travels outward, by the sun's gravitational field. When it strikes the moving Mercury, it's like a ball being struck by a baseball bat. If Mercury is approaching us, twice its velocity must be added to the reflected beam. If receding, it must be subtracted. After reflection, each beam is slowed, by the sun's gravitational field, as it travels out to Earth. Accurate calculations, by this method, completely account for the observed results. They are obtainable, from the undersigned, at no charge.

If these factors were not allowed for, an assumption of forty-three seconds of arc per century perihelion rotation of Mercury's orbit would be necessary.

WILLIAM T. THOMAS, JR.
Optical Consultant
Pres., D. B. Stargazers
105 North Halifax Avenue
Daytona Beach, Florida, 32018

It's the extreme cases that really test observational techniques, and theories!

Dear Mr. Campbell:

The announcement of FASEG accomplishment by Messrs. Janifer and Kantor is not nearly so astounding as their escape, through a fortuity statistically applicable only to special categories of irresponsibility, from what could well have been catastrophic consequences.

Only one of their stated three basic principles is even partly valid: that the excited state is brought into being by absorption of a fairy godmother (FGM). And although the physical action of their stumbled-upon premise is substantially correct as to effect, the proper relationship of FGM to the excited state is *ad*sorption in that each FGM is thus evenly distributed over all *surfaces* of the carriage and so at all times in contact with its environs. The importance of this distinction, apart from its function, will be seen in the following.

Janifer and Kantor *assumed* simple absorption, and *assumed* decay

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to ground state through operation of the *assumed* principle that decay would occur at midnight. They overlooked altogether two essential factors: (a) Midnight occurs a minimum of twenty-three times each day (and more often, in strict application, because the geographic disposition of land masses does not in all cases accommodate clean divisions into regular time zones) even irrespective of local considerations for Daylight Saving and such concoctions as British Double Summer War Time or whatever it was called; and (b) that procession of the equinoxes which makes necessary the conservation of some six hours every year and the addition of an extra day every Leap Year. With this condition of variables, no reaction simply scheduled for midnight could possibly take place without the presence of an *outside* control in the form of an *ad*sorbed FGM.

The fact that the gentlemen purport to have successfully brought in the experiment suggests to me that, given the exact moment and place of the action, some interesting and valuable work might now be done in backtracking the literature and pinpointing it to a precise midnight at a precise location. I am certain that archeologists would be most interested in the ramifications of such procedures, the carbon-dating methods being less than adequate in early antiquity.

In their third presumption, these reckless and capricious inventors followed the unsupportable principle that there is somehow a one-to-one relationship among carriages, pumpkins, and FGM. This unsupportability lies in their failure to (a) define the exact type of carriage or variety of pumpkin; (b) their assumption that a collateration exists between a given quantity of FGM and a given quantity of carriages and/or pumpkins; and (c) the finality of their implication that they possess the capability of fabricating an excited-state carriage having precisely the qualities engendering its capacity for stimulated degeneration into a specific cucurbitaceous seed-pod.

I submit that this is outrageous pomposity and that these gentlemen, through a bit of luck indicated at the beginning of this comment, only happened upon the proper selection and sequence of ingredients and cannot of themselves be certain of—or perhaps even again obtain—those peculiar types and kinds of wood, leathers, metals, cloths, adhesives, lubricants, and engineering and craft talents, essential to the fabrication of carriages having both a propensity to the adsorption of FMG and an excited state likely to decay under exact stimuli. And it was luck—sheer luck and ignorance—that caused them to omit inclusion of the harnesses, traces and reins—which any farm boy knows are components of the vehicle and not of the motive power. Had these parts not been erroneously exclud-

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ed, FGM emission might well have been accompanied by a proliferation of white mice together with the inexplicable disappearance of liveried footmen and white horses—the present supply of which, in both cases, is such that any marked diminishment would be likely to arouse immediate and international concern.

I would allow the possibility of laboratory-controlled duplication of the stated experiment, all circumstances being absolutely in order—including midnight—but categorically reject any probability that such a reaction can be sustained protractedly by assembly-line introduction of essential new components.

My greatest concern, however, even beyond that economic displacement which must accompany saturation of the pumpkin market should my comments somehow lead to a perfection of the art rather than to its discouragement, is the inventors' basic assumption that the process invariably results in the emission of *Good* Fairy Godmothers (GFGM). Obviously, these two have not researched pertinent and allied literature as well as that which served their purposes. I do not have available any authoritative data on the statistical ratio of GFGM to EFGM (Evil Fairy Godmothers), but *presumably* the ratio favors GFGM. But in any case there must, according to the literature, be a significant proportion of EFGM—those who deal in poisoned apples, mirror-mirrors on the wall, and the like.

In the technique described, wherein a body in excited state is situated between two untenable positions and then stimulated, reactions of GFGM and EFGM would be opposite but ultimately equal. Whereas the GFGM would oscillate between two untenable positions and emerge by passage through the least untenable, EFGM would equally oscillate between two desirable positions and (a) cling to the most desirable and be forced through it only by the pressure of other EFGM, or (b) emit at a 90° tangent and probably take along the entire apparatus including the operator.

I have no great concern for the operator, because he would likely be one of this upstart pair, or an associate. But the concept of a steady flow of by-product EFGM—if this thing should really work—frightens me. We have problems enough.

If my complaint can count for anything, I say stop this nonsense at once.

And I also advise shelving of the Elf-consistency program.

Some Elves are Trolls.

DON GREEN
3638 Olympiad Drive,
Los Angeles, California

Never having studied in this field myself, I'll leave this hassle to you . . . well, experts.

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ble of igniting any other burnable material—including ordinary steel (which will burn with a brilliant, spark-emitting flame in pure oxygen—the principle of the oxygen-cutting torch used in dismembering steel structures).

The modern miniature flashbulbs used in amateur photography are glass bulbs enclosing crumpled zirconium alloy metal foil, and an atmosphere of pure oxygen. Zirconium is titanium's closest chemical relative; its properties are almost exactly the same, save that zirconium is a heavier element, and the metal's denser. The sudden, almost instantaneous speed with which zirconium burns in pure oxygen suggests what sheet titanium could do in a space capsule, in a pure-oxygen atmosphere.

The enormous heat energy generated by that combustion in a flashbulb would, one at first imagines, cause the glass bulb to explode. It doesn't, obviously. The reason is that the combustion is so rapid that the oxygen is consumed, and tied down in solid ZrO faster than the gas can become heated and expand—and after the flash, the bulb is a partial vacuum.

Before zirconium, with its higher temperature and brighter light was available, flashbulbs used a magnesium-aluminum alloy in pure oxygen.

All in all, there were some excellent opportunities for a real flash fire in the space capsule! Built in electric power supply to provide ignition—sheet titanium and magnesium—pure oxygen gas . . .

Some years ago, Bell Telephone Laboratories did some experiments involving boiling away tungsten and carbon and other ultra-refractory materials, in a very interesting manner. They did it by mounting minute particles of the material in the center of an electronic flashtube, of the general class used in the familiar electronic photoflash lamps, but a couple orders of magnitude more powerful. The xenon gas arc produced sudden flashes of radiant energy so violent that the refractory materials—being dark and radiation-absorbent—exploded into vapor in about 1/100,000th of a second. Even though the particles were mounted on quartz supports, or suspended in a liquid, they—but not the supports—vaporized: heat couldn't be transmitted away in so brief a time.

A flash titanium or magnesium fire in a space capsule could generate such an enormous, sudden flash of radiant energy as to ignite all organic material in the capsule, and

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char materials that wouldn't burn even in a pure-oxygen atmosphere. Teflon, for example, wouldn't burn in such an atmosphere—but under violent radiation energy would break down to free carbon, and free floride radicals. The free carbon would, normally, burn in the oxygen. Ordinary plastics would break down and/or burn.

But if organic material did break down and burn, the products would be largely carbon dioxide and water vapor; in the presence of burning titanium, the oxygen in the capsule would be exhausted very rapidly—and the carbon dioxide and water produced by the first flash burning would now be consumed to yield free-carbon—soot—and hydrogen.

The three astronauts in the Apollo 1 capsule were all trained, seasoned test pilots. Testing planes for years, their business had, in essence, been to see how much stress this craft could take without breaking apart around them, or showing some wild, uncontrollable misbehavior. Their normal operating mode, one might say, was at the edge of catastrophe—to find out where that edge was, and what kind of catastrophe would occur if it were passed.

Such men are trained, conditioned, and dedicated to getting the data, and *getting the data back to the ground*. They are not given to hysteria or panic; any such were eliminated long before they got even close to the Astronaut Training Center.

They are selected for, and trained to, fast, accurate reflexes—doing the right thing in split seconds.

Of these three abnormally fast-acting men, only one was able to report "Fire in the spacecraft!" Which one isn't known at this writing. His reaction was, as expected of such men, fast, accurate, and useful communication. You don't expect such men to cry: "Help! I've been hurt byaaaahhhhgh. . . ." That doesn't tell Ground Control anything useful. And just "Fire!" wouldn't help much. "The thing's on fire!" wouldn't help either; it doesn't say *what's* on fire. Whether it was Grissom, White or Chaffee, he got all the information he could in his brief call. The fire was inside; it was the space vehicle itself, not the rocket boosters, or the gantry structure, that was burning.

But . . . *only one of three super-competent, super-trained men was able to call out any information.*

With men of that caliber, if you shot him through the heart—he'd live long enough, and have the will to say what had killed him. Sear him with any ordinary blowtorch, and he'd live long enough and have will enough, to report. It must have been a most extraordinarily sudden, violent, and vicious fire; two of the three evidently did not have so much as a half-second to begin a reaction.

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If a man has just exhaled, he can't say anything until he inhales—and if the atmosphere has suddenly been raised to some 1,000°C, he can't inhale. Rather, he'll have no vocal mechanism after he does. That chance matter of inhaling or exhaling at the critical instant may have determined who could, and who could not, report.

The point of importance is that the disaster must have been practically as sudden as a jet fighter running into a cloud-hidden mountainside at 1200 miles an hour. The pilot might glimpse it a half-second before striking—but that isn't a useful time-interval.

Data hasn't been released on what structural materials were actually employed in the capsule. Since NASA's been conscious of fire-danger problems for some while, I doubt that they were using any readily flammable organic materials. What kind of insulation was used on the miles of wiring in the ship I don't know—but it's a fair bet that it was polyvinyl chloride. The stuff will burn, but only with great reluctance, and even in pure oxygen it won't go very fast. It certainly wouldn't have been rubber or cotton insulation! Polytetrafluorethylene and its close relatives are quite possible—but they don't burn at all, though they can be cracked to various poisonous breakdown products. (See Joe Poyer's recent story, "Pioneer Trip," February 1967 Analog.) But this wouldn't be relevant in a flash-fire problem; poisons wouldn't have had time to work any harm.

The contour couches the astronauts lie-sit in are undoubtedly largely organic structures. What they're made of isn't published data; again, though, polyvinylchloride is a fairly good bet for the surface covering, and a urethane foam padding. Burnable—but not wildly enthusiastic. Particularly if it's been treated with some of the fire-retardant bromide organics now widely included in products of that nature. Fiber-glass epoxy plastic panels offer such high stiffness-weight ratios that they're highly advantageous in many panel surface applications; again, combustion is possible, but somewhat as it's possible that a Scotsman give generously to the W.C.T.U.

It isn't probable, then, that there would be much organic material—cotton, wool, et cetera—available in that capsule.

There were two possible high-temperature, large-quantity energy sources that could have started the structural materials of the capsule burning with the necessary flash violence; both depend on the fuel cell batteries. One is an electric arc—and *not* just a spark! The other is a ruptured hydrogen line, which could be ignited by a spark to produce a hydrogen-oxygen blowtorch effect capable of igniting the metallic materials around.

An oxy-hydrogen fuel cell is a

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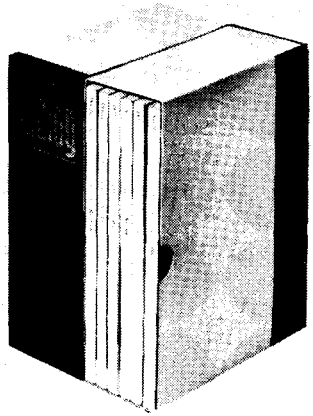
plumber's nightmare. In a 30-cell oxy-hydrogen fuel battery, there must be separate oxygen and hydrogen feed pipes leading to each cell, through numerous joints and attachments. Now hydrogen will leak happily through a perfectly air-tight joint; its small molecule can get through crevices that the big O_2 and N_2 molecules couldn't struggle into.

If there had been a slow leak of H_2 from a bad battery connection, one would expect a gradual build up of the odorless, colorless, tasteless gas inside the capsule, until a concentration great enough for a tiny spark somewhere—the minute spark as a switch was thrown, for instance—to set it burning.

In that case, the inquiry would be involved in trying to find out why parts of the Apollo 1 capsule were now spread from one end of the Cape to the other, and what made the Saturn booster open out like a peeled banana. It wouldn't have been a "flash fire"; it would have been a detonation.

However, if something went wrong in the battery, and one of the pipes burst, releasing a jet of hydrogen—the resultant oxy-hydrogen blowtorch could set off all the light-strong metals in the near vicinity.

If something went wrong so that electric power from outside was forced *into* the oxy-hydrogen cells, instead of being drawn from them —that would cause electrolysis in the cells, generating hydrogen and oxygen by breaking down water.



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Since there was no provision for "charging" the fuel cells, the result would be a mixture of hydrogen and oxygen inside the cells, and a rapidly rising pressure. A purely pneumatic explosion could rip open a cell, and with that mixture around, the probability of something setting it off becomes about 0.99999+.

There are indications that, while the test at that point was supposed to be a "plugs out" test, with the capsule working on internal power from the fuel battery—nevertheless one of the plugs had *not* disconnected completely, and external power was being pumped in.

It's customary to ground one end of the battery to the frame of a metal machine—your automobile works on that basis, for instance—partly because that saves the necessity for running two heavy-duty, and therefore heavy, cables to all the equipments. With weight so important, it's a pretty safe bet that the structural members of the capsule were the conductors for one side of the DC power supply—either the + or − line. The other side of the line would then be carried in an insulated cable, led through holes drilled in the structural members, or clamped to skin plates with standard cable clamps. Let that insulation fail, and bare copper touch the hull structure anywhere, and you'd have an extremely intense, persistent arc. Being DC, an arc once started wouldn't break easily, as it does when AC current is used—DC never goes to zero volts for even the instant it takes for an arc to quench. Since the fuel battery was designed to deliver kilowatts of power, under short-circuit conditions, there'd be plenty of fire to start titanium burning.

That fire would be so intense, the radiation from the burning titanium so violent, that organic material anywhere near would go into flame in fractions of a second—and all available oxygen consumed in seconds.

It's reported that the Russians don't use a pure-oxygen environment in their space capsules, but an oxy-nitrogen mixture like normal air, or an oxy-helium mixture. Fire in an oxy-helium mixture is less likely than fire in a pure oxygen atmosphere; a cigarette, which smolders peaceably in oxy-nitrogen explodes into a coruscating burst of white flame in pure oxygen—as, every so often, some chemically naïve hospital patient in an oxygen tent discovers when he's "gotta have another cigarette." In oxy-helium mixture, the cigarette tends to go out. Reason: Helium is inert, of course, but it's about the best heat-conducting gas there is. It cools things off so fast that men who are comfortable at 72° in an oxy-nitrogen mixture, have to have 85° in an oxy-helium atmosphere.

However, the oxy-nitrogen atmosphere wouldn't do a thing to

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slow down a titanium fire; the stuff burns as well in nitrogen as it does in air, simply forming the nitride instead of a mixture of oxide and nitride. Magnesium, also, will burn in nitrogen—but much less vigorously.

NASA hasn't used a mixed atmosphere quite largely because to do so requires duplication of the life-support gas regulation—and that means weight, complexity, and added failure possibility.

A two-gas system wouldn't do much to stop the oxy-hydrogen blowtorch from ruptured oxy-hydrogen fuel batteries, either.

What could be done, then?

Since the days of the first iron ships, metallic construction has been The Thing for strong, light, tough structures. Stronger metals —tougher—stiffer—more heat and chemical resistant—but still metals are The Thing.

Of course, during WWII England produced the highly successful Mosquito bomber out of wood—but that was due to wartime shortages, combined with the fact that England had a large force of skilled cabinet-makers with no other useful talents. It was one of the most successful bombers of the war—fast, tough, reliable, and very readily repaired if it got home at all (and they did, with gratifying regularity).

Recent work in ceramics and fibers has shown that boron, carbon, and silicon carbide fibers have mechanical characteristics that make a metallurgist gasp; these fibers show tensile strength and stiffness factors greater by more than an order of magnitude than that of any metal.

Even the currently widely available glass-fiber-epoxy materials are as strong as steel, as light as aluminum, and much stiffer and more elastic than either. True, they *can* be charred and burned—the organic resin part can—but they're not inflammable. They're exceedingly tough, and unlike metals, can be given oriented strength—strength concentrated in the direction it's needed.

Given boron or carbon fiber mounted in some of the new high-temperature synthetic plastics—metals cannot match them or approach them for strength/weight ratio, nor for stiffness/weight ratio. I've handled a boron fiber—with warning that although it was almost invisibly fine, it had to be handled with care, because its stiffness was so great, despite the minute thickness, that it could readily run through skin, muscle and tendons! Carbon fibers have similar startling properties.

But epoxy-glass-fiber materials, *now available* commercially, have been shown to be lighter and stronger for space-vehicle fuel tanks than titanium or stainless steel structures.

And . . . be it remembered that the heat shield that protects the reentering space capsule from the ter-

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rific heating of atmospheric friction is a plastic-and-ceramic structure. No metal can stand the combination of tens of thousands of degrees of heat and abrasion-erosion of the gas stream.

Must spaceships be built of metals?

Gradually men have been breaking away from the old channel of metallic thinking in that other extreme environment—the deep oceans. It's been shown that an epoxy-fiber-glass submarine that is self-floating (i e., it has an overall average density less than that of water) can be made of epoxy-glass which can descend to greater depths —about 25% greater!—than can an all-titanium structure, which in turn is able to reach greater depths than either a steel (denser metal) or aluminum (weaker though lighter metal) hull.

Another surprise is the all-glass hull—which can stand greater pressure than an all-steel hull, because glass is far stronger under uniform compressive loads than is steel.

Once in space, the space capsule is immune to fire hazard (except for gas fires! Hydrogen and oxygen would still mix and detonate.) The problem is that we need a vehicle capable of operating *and being tested* safely in the Earth's atmosphere. Since the current space capsules spend much more time being tested in atmosphere than they ever do flying in orbits—they need to be Earth-proof as well as space-proof.

The first American astronaut to die was killed by a goose. It came in through the windshield of his T-38 jet trainer.

The next two to die were killed when their jet plane crashed as they were coming in for a landing.

The latest three died during routine tests being conducted on the launch pad.

Space flight retains its unblemished record as the safest form of transportation known to Man.

Sure—sooner or later someone will find a new and unexpected way of dying in space. It's pioneering, remember.

But as of now, it has a record of hundreds of millions of passenger miles, with no deaths or injuries. It's obviously more dangerous to drive your car down to the corner drugstore for an ice cream soda.

I think it's time we gave up our metal-oriented thinking and made testing those ultra-safe-in-space ships on the ground safer.

Do we need flammable metals?

Whether the data available to you as you read this—and not yet available to me as I write—shows that flaming metal was not involved is not crucial to the point.

Finagle's First Law *is:* "In any experiment, if anything can happen —it will!"

The light, strong metals burn with inextinguishable violence. It *can* happen.

The Editor.

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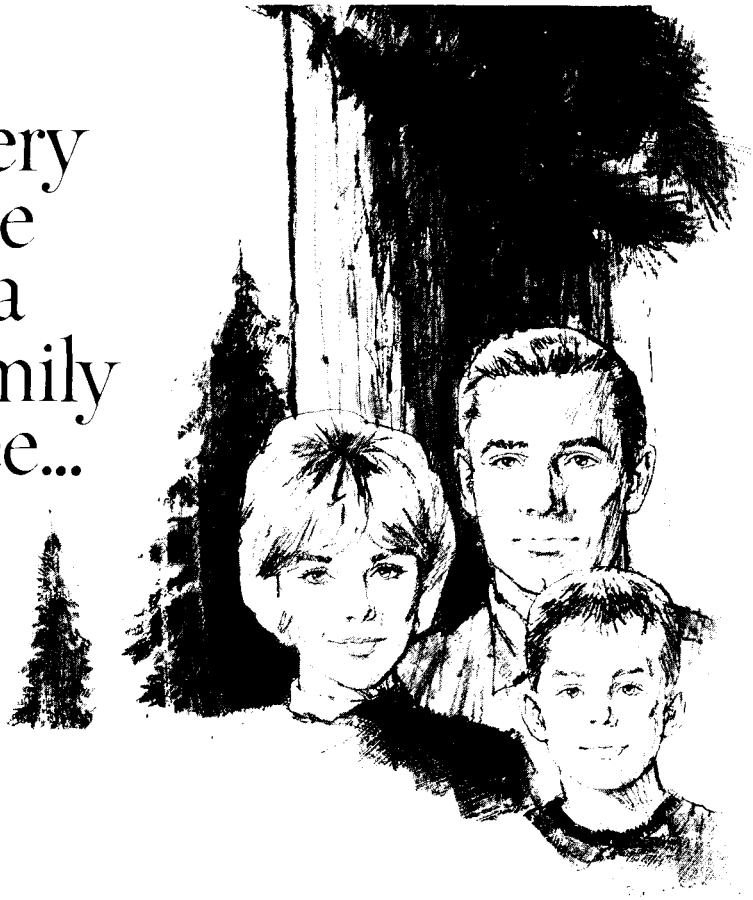

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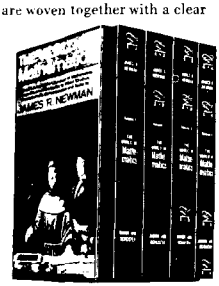

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